SMITHSONIAN MISCELLANEOUS COLLECTIONS.
261

DIRECTIONS

FOR

COLLECTING AND PRESERVING INSECTS.

PREPARED FOR THE USE OF

THE SMITHSONIAN INSTITUTION,

BY

A. S. PACKARD, Jr., M.D.

SMITHSONIAN INSTITUTION.
ORGANIZED. A.D. 1846.

WASHINGTON:
SMITHSONIAN INSTITUTION.
SEPTEMBER, 1873.

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ADVERTISEMENT.

In the Smithsonian Report for 1858, a paper was published on the method of collecting and preserving insects, prepared by Baron Ostensacken, of the Russian Legation, with contributions by other eminent entomologists, which has rendered valuable service in the way of awakening an interest in Entomology and in facilitating the collecting of specimens. It was, however, not stereotyped, and as the methods of gathering and preserving insects have been much improved since its date, it has been thought advisable to request Dr. Packard, as a leading authority, to furnish a new treatise on the same subject. In compliance with this request he has prepared the following pages, derived mainly from the "Guide to the Study of Insects,"* though with some additions and corrections, corresponding with the present state of our knowledge.

JOSEPH HENRY,
Secretary Smithsonian Institution.

Smithsonian Institution,
Washington, September, 1873.

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* Published by the Naturalists' Agency, Salem, Mass. 8vo.

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DIRECTIONS FOR COLLECTING AND PRESERVING INSECTS.

GENERAL CONSIDERATIONS.

INSECTS differ sexually in that the female often appears to have one abdominal ring less (one ring disappearing during the semi-pupa state, when the ovipositor is formed), and in being larger, fuller, and duller colored than the males, while the latter often differ in sculpture and ornamentation. In collecting, whenever the two sexes are found united they should be pinned upon the same pin, the male being placed highest. When we take one sex alone we may feel sure that the other is somewhere in the vicinity; perhaps while one is flying about so as to be easily captured the other is hidden under some leaf, or resting on the trunk of some tree near by, which must be examined and every bush in the vicinity vigorously beaten by the net. Many species rare in most places have a *metropolis* where they occur in great abundance. During seasons when his favorites are especially abundant, the collector should lay up a store against years of scarcity.

At no time of the year need the entomologist rest from his labors. In the winter, under the bark of trees and in moss, he can find many species, or detect their eggs on trees, etc., which he can mark for observation in the spring when they hatch out.

He need not relax his endeavors day or night. Mothing is night employment. Skunks and toads entomologize at night. Early in the morning, at sunrise, when the dew is still on the leaves, insects are sluggish and easily taken with the hand; so at dusk, when many species are found flying; and in the night, the collector will be rewarded with many rarities, some species flying then that hide themselves by day, while many caterpillars leave their retreats to come out and feed, when the lantern can be used with success in searching for them.

Wollaston (Entomologist's Annual, 1865) states that sandy districts, especially towards the coast, are at all times preferable to clayey ones, but the intermediate soils, such as the loamy soil of swamps and marshes, are more productive. Near the sea, insects occur most abundantly beneath pebbles and other objects in grassy spots, or else at the roots of plants. In many places, especially in alpine tracts, as we have found on the summit of Mt. Washington and in Labrador, one has to lie down and look carefully among the short herbage and in the moss for Coleoptera.

The most advantageous places for collecting are gardens and farms, the borders of woods and the banks of streams and ponds. The deep, dense forests, and open, treeless tracts are less prolific in insect life. In winter and early spring the moss on the trunks of trees, when carefully shaken over a newspaper or white cloth, reveals many beetles and Hymenoptera. In the late summer and autumn, toadstools and various fungi and rotten fruits attract many insects, and in early spring when the sap is running we have taken rare insects from the stumps of freshly cut hard-wood trees. Wollaston says, "Dead animals, partially dried bones, as well as the skins of moles and other vermin which are ordinarily hung up in fields, are magnificent traps for Coleoptera; and if any of these be placed around orchards and inclosures near at home, and be examined every morning, various species of *Nitidulæ*, *Silphidæ*, and other insects of similar habits, are certain to be enticed and captured.

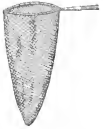
"Planks and chippings of wood may be likewise employed as successful agents in alluring a vast number of species which might otherwise escape our notice, and if these be laid down in grassy places, and carefully inverted every now and then with as little violence as possible, many insects will be found adhering beneath them, especially after dewy nights and in showery weather. Nor must we omit to urge the importance of examining the under sides of stones in the vicinity of ants' nests, in which position, during the spring and summer months, many of the rarest of our native Coleoptera may be occasionally procured." Excrementitious matter always contains many interesting forms in various stages of growth.

The trunks of fallen and decaying trees offer a rich harvest for many wood-boring larvæ, especially the Longicorn beetles; and weevils can be found in the spring, in all stages. Numerous carnivorous Coleopterous and Dipterous larvæ dwell within them, and other larvæ which eat the dust made by the borers. The inside of pithy plants like the elder, raspberry, blackberry, and syringa, is inhabited by many of the wild bees, *Osmia*, *Ceratina*, and the wood-wasps, *Crabro*, *Stigma*, etc., the habits of which, with those of their Chalcid and Ichneumon parasites, offer endless amusement and material for study.

Ponds and streams shelter a vast throng of insects, and should be diligently dredged with the water-net, and stones and pebbles should be overturned for aquatic beetles, Hemiptera and Dipterous larvæ.

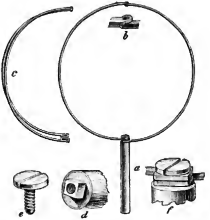
The various sorts of galls should be collected in spring and autumn and placed in vials or boxes, where their inhabitants may be reared, and the rafters of out-houses, stone-walls, etc., should be carefully searched for the nests of mud-wasps.

Fig. 1.



Collecting Apparatus. First in importance is the *net*. (Fig. 1.) This is made by attaching a ring of brass wire to a handle made to slide on a pole six feet long. The net may be a foot in diameter, and the bag itself made of thin gauze or mosquito-netting (the finer, lighter, and more durable the better), and should be about twenty inches deep. It should be sewed to a narrow border of cloth placed around the wire. A light net like this can be rapidly turned upon the insect with one hand. The insect is captured by a dexterous twist which also throws the bottom over the mouth of the net. "The frame of the net which I use is illustrated herewith (Fig. 2), and will be found strong and serviceable and conveniently portable. It is constructed as follows: Take two pieces of stout brass wire, each about 20 inches long; bend them half-circularly and join at one end by a folding hinge having a check on one side (*b*). The other ends are bent and beaten into two square sockets (*f*) which fit to a nut sunk and soldered into one end of a brass tube (*d*). When so fitted, they are secured by a large-headed screw (*e*) threaded to fit into the nut-socket, and with a groove wide enough to receive the back of a common pocket knife blade. The wire hoop is easily detached and folded, as at *c*, for convenient carriage; and the handle may be made of any desired length by cutting a stick and fitting it into the hollow tube *a*, which should be about six inches long. It is well to have two separate hoops — one of lighter wire furnished with silk gauze or some other light material for catching flying insects; and one which is stouter and furnished with a net of stronger material for sweeping non-flying specimens.

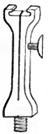
Fig. 2.



"Another still more simple, but less convenient, frame is thus described by my friend F. G. Sanborn, of Boston, Mass.:

"'Make a loop of strong iron or brass wire, of about 3-16ths of an inch in thickness, so that the diameter of the loop or circle will not exceed twelve inches, leaving an inch to an inch and a half of wire at each end bent at nearly right angles. Bind the two extremities of the wire together with smaller wire and tin them by applying a drop of muriate of zinc, then holding it in the fire or over a gas flame until nearly red hot, when a few grains of block tin or soft solder placed upon them will flow evenly over the whole surface and join them firmly together. Take a Maynard rifle cartridge tube, or other brass tube of similar dimensions; if the former, file off the closed end or perforate it for the admission of the wire, and having tinned it in the same manner on the inside, push a tight fitting cork half-way through and pour into it melted tin or soft solder, and insert the wires; if carefully done, you will have a firmly constructed and very durable foundation for a collecting net. The cork being extracted will leave a convenient socket for inserting a stick or walking cane to serve as a handle.'

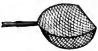
Fig. 3.



"My friend, J. A. Lintner, of Albany, New York, makes very good use, in his ordinary promenades, of a telescopic fish-rod, with a head (Fig. 3) screwed on to one end, in which to fasten an elastic brass coil on which the net is drawn, but which when not in use sets snugly inside his silk hat." (C. V. Riley, Fifth Annual Report Ins. Mo., 1873.)

The insect should be temporarily held between the thumb and forefinger of the hand at liberty, and then pinned through the thorax while in the net. The pin can be drawn through the meshes upon opening the net. The *beating-net* should be made much stouter, with a shallower cloth bag and attached to a shorter stick. It is used for beating trees, bushes, and herbage for beetles and Hemiptera and various larvæ. Its thorough use we would recommend in the low vegetation on mountains and in meadows. The *water-net* may be either round or of the shape indicated in Fig. 4. The ring should be made of brass, and the shallow net of grasscloth or coarse millinet. It is used for collecting aquatic insects.

Fig. 4.



Various sorts of *forceps* are indispensable for handling insects. Small delicate narrow-bladed forceps, with fine sharp points, such as are used by jewellers, and made either of steel or brass, are excellent for handling minute specimens. For larger ones long, curved forceps (Fig. 5, after Riley) are very convenient. For pinning insects into boxes the forceps should be stout, the blades blunt and curved at the end so that the insects can be pinned without slanting the forceps much. The ends need to be broad and finely indented by lines so as to hold the pin firmly. With a little practice the forceps soon take the place of the fingers. They will have to be made to order by a neat workman or surgical instrument maker. Fig. 6, after Riley, illustrates another form. Some persons use the ordinary form of pliers with curved handles, but they should be long and slender. A spring set in to separate the handles when not grasped by the hand is a great convenience.

Fig. 5.

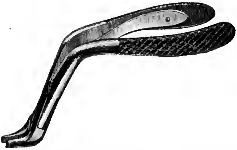
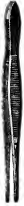


Fig. 6.



Various pill-boxes, vials and bottles must always be taken, some containing alcohol or whiskey. Many collectors use a wide-mouthed bottle, containing a sponge saturated with ether, chloroform, or benzine, or bruised laurel leaves, the latter being pounded with a hammer and then cut with scissors into small pieces, which give out exhalations of prussic acid strong enough to kill most small insects.

Besides these the collector needs a small box lined with corn-pith, or cork, and small enough to slip into the coat-pocket; or a larger box carried by a strap. Most moths and small flies can be pinned alive without being pinched (which injures their shape and rubs off the scales and hairs), and then killed by pouring a little benzine into the bottom of the box.

Killing Insects for the Cabinet. Care in killing affects very sensibly the looks of the cabinet. If hastily killed and distorted by being pinched, with the scales rubbed off and otherwise mangled, the value of such a specimen is diminished either for study or the neat appearance of the collection.

Besides the vapor of ether, chloroform and benzine, the fumes of sulphur readily kill insects. Large specimens may be killed by inserting a pin dipped in a strong solution of oxalic acid. An excellent collecting bottle is made by putting into a wide-mouthed bottle two or three small pieces of cyanide of potassium, which may be covered with cotton, about half-filling the bottle (Figure 7, after Riley). The cotton may be covered with paper lightly attached to the glass and pierced with pin-holes; this keeps the insects from being lost in the bottles. For Diptera, Loew recommends moistening the bottom of the collecting box with creosote. This is excellent for small flies and moths, as the mouth of the bottle can be placed over the insect while at rest; the insect flies up into the bottle and is immediately suffocated. A bottle well prepared will, according to Laboulbène, last several months, even a year, and is vastly superior to the old means of using ether or chloroform. He states, "the inconvenience of taking small insects from a net is well known, as the most valuable ones usually escape; but by placing the end of the net, filled with insects, in a wide-mouthed bottle, and putting in the cork for a few minutes, they will be suffocated." A chloroform bottle with a brush securely inserted in the cork (Fig. 8, after Riley) is often convenient.

Fig. 8.

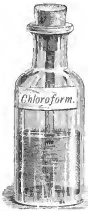
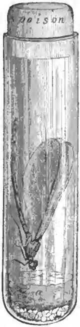


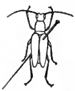
Fig. 7.



Pinning Insects. The pin should be inserted through the thorax of most insects. The Coleoptera, however, should be pinned through the right wing-cover (Fig. 9); many Hemiptera are best pinned through the scutellum (Fig. 10). The specimens should all be pinned at an equal height, so that about one-fourth of the pin should project above the insect.

The best pins are those made in Germany. For very minute insects very small pins are made. They may be used to impale minute insects upon, and then stuck through a bit of cork, or pith, through which a large, long pin may be thrust. Then the specimen is kept out of the reach of devouring insects. Still smaller pins are made by cutting off bits of very fine silvered wire at the right length, which may be thrust by the forceps into a piece of pith, after the insects have been impaled upon them.

Fig. 9.

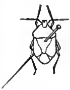


Small insects, especially beetles, may be mounted on cards or pieces of mica through which the pin may be thrust. The French use small oblong bits of mica, with the posterior half covered with green paper on which the number may be placed. The insects may be gummed on the clear part, the two sexes together. The under side can be seen through the thin mica.

Others prefer triangular pieces of card, across the end of which the insect may be gummed, so that nearly the whole under side is visible.

Mr. Wollaston advocates gumming small Coleoptera upon cards. Instead of cutting the pieces of card first, he gums them promiscuously upon a sheet of card-board. "Having gummed thickly a space on your card-board equal to, at least, the entire specimen when expanded, place the beetle upon it, drag out the limbs with a pin, and, leaving it to dry, go on with the next one that presents itself. As the card has to be cut afterwards *around* your insect (so as to suit it), there is no advantage in gumming it precisely *straight upon your frame*,—though it is true that a certain amount of care in this respect lessens your after labor of cutting off very materially. When your frame has been filled, and you are desirous of separating the species, cut out the insects with finely pointed scissors."

Fig. 10.



For mending broken insects, *i. e.*, gumming on legs and antennæ which have fallen off, inspissated ox-gall, softened with a little water, is the best gum.

For gumming insects upon cards, Mr. Wollaston recommends a gum "composed of three parts of tragacanth to one of Arabic, both in powder; to be mixed in water containing a grain of corrosive sublimate, without which it will not keep, until of a consistency just thick enough to run. As this gum is of an extremely absorbent nature, nearly a fortnight is required before it can be properly made. The best plan is to keep adding a little water, and stirring it every few days, until it is of the proper consistency. It is advisable to dissolve the grain of corrosive sublimate in the water which is poured *first* upon the gum."

Preservative Fluids. The best for common use is alcohol, diluted with a little water; or whiskey, as alcohol of full strength is too strong for caterpillars, etc., since it shrivels them up. The spirits should afterwards be changed for alcohol of full strength for permanent preservation. Glycerine is excellent for preserving the colors of caterpillars, though the internal parts decay somewhat, and the specimen is apt to fall to pieces on being roughly handled.

Laboulbène recommends, for the preservation of insects in a fresh state, plunging them in a preservative fluid consisting of alcohol with an excess of arsenic acid in fragments, or the common white arsenic of commerce. A pint and a half of alcohol will take about fourteen grains (troy) of arsenic. The living insect, put into this preparation, absorbs about $\frac{3}{1000}$ of its own weight. When soaked in this liquor and dried, it will be safe from the ravages of moths, *Anthrenus* or *Dermestes*. This liquid will not change the colors of blue, green or red beetles if dried after soaking from twelve to twenty-four hours. Hemiptera and Orthoptera can be treated in the same way.

A stay of a month in this arseniated alcohol mineralizes the insect, so that it appears very hard, and, after drying, becomes glazed with a white deposit which can, however, be washed off with alcohol. In this state the specimens become too hard for dissection and study, but will do for cabinet specimens designed for permanent exhibition.

Another preparation recommended by Laboulbène is alcohol containing a variable quantity of corrosive sublimate, but the latter has to be weighed, as the alcohol evaporates easily, the liquor becoming stronger as it gets older. The strongest solution is one part of corrosive sublimate to one hundred of alcohol; the weakest and best is one-tenth of a part of corrosive sublimate to one hundred parts of alcohol. Insects need not remain in this solution more than two hours before drying. Both of these preparations are very poisonous and should be handled with care. The last-named solution preserves specimens from mould, which will attack pinned insects during damp summers.

A very strong brine will preserve insects until a better liquor can be procured. Professor A. E. Verrill recommends two simple and cheap solutions for preserving, among other specimens, the larvæ of insects "with their natural color and form remarkably perfect." The first consists of two and a half pounds of common salt and four ounces of nitre dissolved in a gallon of water and filtered. Specimens should be prepared for permanent preservation in this solution by being previously immersed in a solution consisting of a quart of the first solution and two ounces of arseniate of potash and a gallon of water.

The nests, cocoons, and chrysalides of insects may be preserved from injury from other insects by being soaked in the arseniated alcohol, or dipped into benzine, or a solution of carbolic acid or creosote.

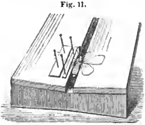
Dr. J. L. Leconte has published in the "American Naturalist," iii, p. 307, some new directions for the preservation of insects which will apply to beetles as well as other insects. "Surgical art has given to us an instrument by which a poisonous liquid can be rapidly and most effectively applied to the entire surface of large numbers of specimens as they stand in the cabinet boxes, without the trouble of moving them. I refer to the 'Atomizer.'

"Opinions may vary as to the nature of the liquid poison to be used, but after several trials I have found the following formula to be quite satisfactory; it produces no efflorescence, even on the most highly polished species, while the odor is quite strong, and persistent enough to destroy any larvæ or eggs that may be already in the box:—saturated alcoholic solution of arsenious acid, eight fluid ounces; strychnine, twelve grains; crystallized carbolic acid, one drachm; mineral naptha (or heavy benzine) and strong alcohol, enough to make one quart. I have not stated the quantity of naptha, since there are some varieties of light petroleum in commerce which dissolve in alcohol only to a slight extent. These should not be used. The heavier oils which mix indefinitely with alcohol are the proper ones, and for the two pints of mixture ten to twelve fluid ounces of the naptha will be sufficient. Care should be taken to test the naptha on a piece of paper. If it leaves a greasy stain which does not disappear after a few hours it is not suitable for this purpose.

"The best form of atomizer is the long, plated, reversible tube; it should be worked with a gum elastic pipe, having two bulbs to secure uniformity in the current. The atomizing glass tubes and the bottle, which usually accompany the apparatus, are unnecessary; a common narrow necked two ounce bottle will serve perfectly to hold the fluid."

Preparing Insects for the Cabinet. Dried insects may be moistened by laying them for twelve or twenty-four hours in a box containing a layer of wet sand, covered with one thickness of soft paper. Their wings can then be easily spread. *Setting-boards* for spreading the wings of insects may be made by sawing deep grooves in a thick board, and placing a strip of pith or cork at the bottom. The groove may be deep enough to allow a quarter of the length of the pin to project above the insect. The setting-board usually consists of thin parallel strips of board, leaving a groove between them wide enough to receive the body of the insect, at the bottom of which a strip of cork or pith should be glued. The ends of the strips should be nailed on to a stouter strip of wood, raising the surface of the setting-board an inch and a half, so that the pins can stick through without touching. Several setting-boards can be made to form shelves in a frame covered with wire gauze, so that the specimens may be preserved from dust and destructive insects, while the air may at the same time have constant access to them. The surface of the board should incline a little towards the groove for the reception of the insect, as the wings often gather a little moisture, relax and fall down after the insect is dried. "For the proper setting of insects with broad and flattened wings, such as butterflies and moths, a spreading board or stretcher is necessary. One that is simple and answers every purpose is shown at figure 11. It may be made of two pieces of thin white-wood or pine board, fastened together by braces, especially at the ends, and left wide enough apart to admit the bodies of the insects to be spread: strips of cork or pith, in which to fasten the pins, may then be tacked or glued below so as to cover the intervening space. The braces must be deep enough to prevent the pins from touching anything on which the stretcher may be laid; and, by attaching a ring or loop to one of them, the stretcher may be hung against a wall, out of the way. For ordinary-sized specimens I use boards 2 feet long, 3 inches wide and ⅓ inch thick, with three braces (one in the middle and one at each end) 1½ inches deep at the ends, but narrowing from each end to 1⅛ inches at the middle. This slight rising from the middle is to counteract the tendency of the wings, however well dried, to drop a little after the insect is placed in the cabinet. The wings are held in position by means of strips of paper (Fig. 11) until dry." (Riley.)

Fig. 11.



Moths of medium size should remain two or three days on the setting-board, while the larger thick-bodied sphinges and *Bombycidæ* require a week to dry. The wings can be arranged by means of a needle stuck into a handle of wood. They should be set horizontally, and the front margin of the fore wings drawn a little forward of a line perpendicular to the body, so as to free the inner margin of the hind wings from the body, that their form may be distinctly seen. When thus arranged, they can be confined by fine threads drawn over the wings, by pieces of card pinned to the board as indicated in figure 11, or, as we prefer, by square pieces of glass laid upon them.

After the insects have been thoroughly dried they should not be placed in the cabinet until after having been in quarantine to see that no eggs of Dermestes or Anthrenus, etc., have been deposited on them.

For preserving dried insects in the cabinet Laboulbène recommends placing a rare insect (if a beetle or any other hard insect) in water for an hour until the tissues are softened. If soiled, an insect can be cleansed under water with a fine hair-pencil, then submit it to a bath of arseniated alcohol with corrosive sublimate. If the insect becomes prune-colored, it should be washed in pure alcohol several times. This method will do for the rarest insects; the more common ones can be softened on wet sand, and then the immersion in the arseniated alcohol suffices. After an immersion of from a quarter of an hour to an hour, according to the size of the insect, the pin is not affected by the corrosive sublimate, but it is better to unpin the insect previous to immersion, and then pin it when almost dry.

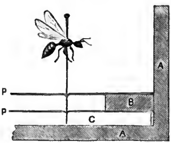
For cleaning insects ether or benzine is excellent, applied with a hair-pencil; though care should be taken in using these substances, which are very inflammable.

After the specimens are placed in the cabinet, they should be farther protected from destructive insects by placing in the drawers or boxes pieces of camphor wrapped in paper perforated by pin-holes, or bottles containing sponges saturated with benzine. The collection should be carefully examined every month; the presence of insects can be detected by the dust beneath them. Where a collection is much infested with destructive insects, benzine should be poured into the bottom of the box or drawer, when the fumes and contact of the benzine with their bodies will kill them. The specimens themselves should not be soaked in the benzine if possible, as it renders them brittle.

Insect-cabinet. For permanent exhibition, a cabinet of shallow drawers, protected by doors, is most useful. A drawer may be eighteen by twenty inches square, and two inches deep in the clear, and provided with a tight glass cover. For constant use, boxes made of thin, well-seasoned wood, with tight fitting covers, are indispensable. For Coleoptera, Dr. Leconte recommends that they be twelve by nine inches (inside measurement). For the larger Lepidoptera a little larger box is preferable. Others prefer boxes made in the form of books, which may be put away like books on the shelves of the cabinet, though the cover of the box is apt to be in the way.

The boxes and drawers should be lined with cork cut into thin slips for soles; such slips come from the cork-cutter about twelve by four inches square, and an eighth of an inch thick. A less expensive substitute is paper stretched upon a frame. Prof. E. S. Morse has given in the "American Naturalist" (vol. i, p. 156) a plan which is very neat and useful for lining boxes in a large museum, and which are designed to be placed in horizontal show-cases (Fig. 12). "A box is made of the required depth, and a light frame is fitted to its interior. Upon the upper and under surfaces of this frame, a sheet of white paper (drawing or log-paper answers the purpose) is securely glued. The paper, having been previously damped, in drying contracts and tightens like a drum-head. The frame is then secured about one-fourth of an inch from the bottom of the box, and the pin is forced down through the thicknesses of paper, and if the bottom of the box be of soft pine, the point of the pin may be slightly forced into it. It is thus firmly held at two or three different points, and all lateral movements are prevented. Other advantages are secured by this arrangement besides firmness; when the box needs cleaning or fumigation, the entire collection may be removed by taking out the frame; or camphor, tobacco, or other material can be placed on the bottom of the box, and concealed from sight. The annexed figure represents a transverse section of a portion of the side and bottom of the box with the frame. A, A, box; B, frame; P, P, upper and under sheets of paper; C, space between lower sheets of paper and bottom of box."

Fig. 12.



Other substitutes are the pith of various plants, especially of corn; and palm wood, and "inodorous felt" are used, being cut to fit the bottom of the box.

Leconte recommends that "for the purpose of distinguishing specimens from different regions, little disks of variously colored paper be used; they are easily made by a small punch, and should be kept in wooden pill-boxes ready for use; at the same time a key to the colors, showing the regions embraced by each, should be made on the fly-leaf of the catalogue of the collection." He also strongly recommends that the "specimens should all be pinned at the same height, since the ease of recognizing species allied in characters is greatly increased by having them on the same level."

He also states that "it is better, even when numbers with reference to a catalogue are employed, that the name of each species should be written on a label attached to the first specimen. Thus the eye is familiarized with the association of the species and its name, memory is aided, and greater power given of identifying species when the cabinet is not at hand." For indicating the sexes the astronomical sign ♂ (Mars) is used for the male, and ♀ (Venus) for the female, and ♀ for the worker.

Transportation of Insects. While travelling, all hard-bodied insects, comprising many Hymenoptera, the Coleoptera, Hemiptera, and many Neuroptera should be thrown, with their larvæ, etc., into bottles and vials filled with strong alcohol. When the bottle is filled new liquor should be poured in, and the old may be saved for collecting purposes; in this way the specimens will not soften and can be preserved indefinitely, and the colors do not, in most cases, change. Leconte states that "if the bottles are in danger of being broken, the specimens, after remaining for a day or two in alcohol, may be taken out, partially dried by exposure to the air, but not so as to be brittle, and these packed in layers in small boxes between soft paper; the boxes should then be carefully closed with gum-paper or paste, so as to exclude all enemies."

Lepidoptera and dragon-flies and other soft-bodied insects may be well preserved by placing them in square pieces of paper folded into a triangular form with the edges overlapping. Put up thus, multitudes can be packed away in tin boxes, and will bear transportation to any distance. In tropical climates, chests lined with tin should be made to contain the insect-boxes, which can thus be preserved against the ravages of white ants, etc.

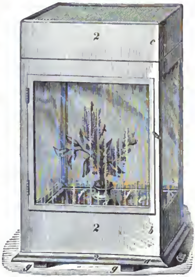
In sending live larvæ by mail, they should be inclosed in little tin boxes, and in sending dry specimens, the box should be light and strong, and directions given at the post-office to stamp the box lightly. In sending boxes by express they should be carefully packed in a larger box, having an interspace of two inches, which can be filled in tightly with hay or crumpled bits of paper. Beetles can be wrapped in pieces of soft paper. Labels for alcoholic specimens should consist of parchment with the locality, date of capture, and name of collector written in ink. A temporary label of firm paper with the locality, etc., written with a pencil, will last for several years.

Preservation of Larvæ. Alcoholic specimens of insects, in all stages of growth, are very useful. Few collections contain alcoholic specimens of the adult insect. This is a mistake. Many of the most important characters are effaced during the drying process, and for purposes of general study alcoholic specimens, even of bees, Lepidoptera, Diptera, and dragonflies are very necessary.

Larvæ, generally, may be well preserved in vials or bottles of alcohol. They should first be put into whiskey, and then into alcohol. If placed in the latter first, they shrivel and become distorted. Mr. E. Burgess preserves caterpillars with the colors unchanged, by immersing them in boiling water thirty or forty seconds, and then placing them in equal parts of alcohol and water. It is well to collect larvæ and pupæ indiscriminately; even if we do not know their adult forms we can approximate to them, and in some cases tell very exactly what they must be.

Rearing Larvæ. More attention has been paid to rearing caterpillars than the young of any other suborder of insects, and the following remarks apply more particularly to them, but very much the same method may be pursued in rearing the larvæ of beetles, flies, and Hymenoptera. Subterranean larvæ have to be kept in moist earth, aquatic larvæ must be reared in aquaria, and carnivorous larvæ must be supplied with flesh. The larvæ of butterflies are rare; those of moths occur more frequently, while their imagos may be scarce. In some years many larvæ, which are usually rare, occur in abundance, and should then be reared in numbers. In hunting for caterpillars bushes should be shaken and beaten over newspapers or sheets, or an umbrella; herbage should be swept, and trees examined carefully for leaf-rollers and miners. The best specimens of moths and butterflies are obtained by rearing them from the egg, or from the larva or pupa. In confinement the food should be kept fresh, and the box well ventilated. Tumblers covered with gauze, pasteboard boxes pierced with holes and fitted with glass in the covers, or large glass jars, are very convenient to use as cages. The bottom of such vessels may be covered with moist sand, in which the food-plant of the larva may be stuck and kept fresh for several days. Larger and more airy boxes, a foot square, with the sides of gauze, and fitted with a door, through which a bottle of water may be introduced, serve well. The following extract from Riley's "Fifth Annual Report on the Injurious Insects of Missouri" illustrates his style of vivarium :—

Fig. 13.



"For larger insects I use a breeding cage or vivarium of my own devising, and which answers the purpose admirably. It is represented in figure 13, and comprises three distinct parts: 1st, the bottom board (*a*), consisting of a square piece of inch-thick walnut with a rectangular zinc pan (*ff*), 4 inches deep, fastened to it, above, and with two cross pieces (*gg*) below, to prevent cracking or warping, facilitate lifting, and allow the air to pass underneath the cage. 2d, a box (*b*), with three glass sides and a glass door in front, to fit over the zinc pan. 3d, a cap (c), which fits closely on to the box, and has a top of fine wire gauze. To the centre of the zinc pan is soldered a zinc tube (*d*) just large enough to contain an ordinary quinine bottle. The zinc pan is filled with clean sifted earth or sand (*e*), and the quinine bottle is for the reception of the food-plant. The cage admits of abundant light and air, and also of the easy removal of the excrement and frass which fall to the ground; while the insects in transforming enter the ground or attach themselves to the sides or the cap, according to their habits. The most convenient dimensions I find to be 12 inches square and 18 inches high: the cap and the door fit closely by means of rabbets, and the former has a depth of about 4 inches to admit of the largest cocoon being spun in it without touching the box on which it rests. The zinc pan might be made 6 or 8 inches deep, and the lower half filled with sand, so as to keep the whole moist for a greater length of time.

"A dozen such cages will furnish room for the annual breeding of a great number of species, as several having different habits and appearance, and which there is no danger of confounding, may be simultaneously fed in the same cage. I number each of the three parts of each cage to prevent misplacement and to facilitate reference, and aside from the notes made in the note-book, it will aid the memory, and expedite matters, to keep a short open record of the species contained in each cage, by means of slips of paper pasted on to the glass door. As fast as the different specimens complete their transformations and are taken from the cage, the notes may be altered or erased, or the slips wetted and removed entirely. To prevent possible confounding of the different species which enter the ground, it is well, from time to time, to sift the earth, separate the pupæ and place them in what I call imago cages, used for this purpose alone and not for feeding. Here they may be arranged, with reference to their exact whereabouts."

The object is to keep the food-plant fresh, the air cool, the larva out of the sun, and in fact everything in such a state of equilibrium that the larva will not feel the change of circumstances when kept in confinement. Most caterpillars change to pupæ in the autumn; and those which transform in the earth should be covered with earth, kept damp by wet moss, and placed in the cellar until the following summer. The collector in seeking for larvæ should carry a good number of pill-boxes, and especially a close tin box, in which the leaves may be kept fresh for a long time. The different forms and markings of caterpillars should be noted, and they should be drawn carefully together with a leaf of the food-plant, and the drawings and pupa skins, and perfect insect, be numbered to correspond. Descriptions of caterpillars cannot be too carefully made, or too long. The relative size of the head, its ornamentation, the stripes and spots of the body, and the position and number of tubercles, and the hairs, or fascicles of hairs, or spines and spinules, which arise from them, should be noted, besides the general form of the body. The lines along the body are called *dorsal*, if in the middle of the back; *subdorsal*, if upon one side, *lateral*, and *ventral* when on the sides and under surface, or *stigmatal* if including the *stigmata* or breathing pores, which are generally parti-colored. Indeed, the whole biography of an insect should be ascertained by the observer; the points to be noted are:

1. Date when and how the eggs are laid; and number, size, and marking of the eggs.

2: Date of hatching, the appearance, food-plant of larva, and number of days between each moulting; the changes the larva undergoes, which are often remarkable, especially before the last moulting, with drawings illustrative of these; the habits of the larva, whether solitary or gregarious, whether a day or night feeder; the ichneumon parasites, and their mode of attack. Specimens of larvæ in the different moultings should be preserved in alcohol. The appearance of the larvæ when full-fed, the date, number of days before pupating, the formation and description of the cocoon, the duration of larvæ in the cocoon before pupation, their appearance just before changing, their appearance while changing, and alcoholic specimens of larvæ in the act, should all be studied and noted.

3. Date of pupation; description of the pupa or chrysalis; duration of the pupa state, habits, etc.; together with alcoholic specimens, or pinned dry ones. Lepidopterous pupæ should be looked for late in the summer or in the fall and spring, about the roots of trees, and kept moist in mould until the imago appears. Many Coleopterous pupæ may also occur in mould, and if aquatic, under submerged sticks and stones, and those of borers under the bark of decaying trees.

4. Date when the insect escapes from the pupa, and method of escape; duration of life of the imago; and the number of broods in a season.

Classification of Insects. That branch of the Animal Kingdom, known as the *Articulata*, was so called by Cuvier in his work on the animal kingdom, from having the body composed of rings, like short cylinders, which are placed successively one behind the other. In the class of *Worms* these rings or segments are arranged in a continuous row, and their number is indefinite. The organs of locomotion consist of tubercles bearing bristles placed in a row, one on each side of each ring; while on the head-rings there are slender feelers directed forwards and placed around the mouth-opening. In the class of *Crustacea* this continuity of rings is broken, and they for the most part bear hard, jointed appendages; and there is usually a definite number (20), which are gathered into two regions: the head-thorax and abdomen. In the class of *Insects*, the number of rings is still more limited (18), the head, consisting of four rings, is distinctly separated from the thorax, thus forming, with the abdomen or hind-body, three distinct regions.

In the Insects, again, there are three modes of disposing the rings and their appendages:—

1. Where the number of segments is indefinite, and much like each other in form, supporting both thoracic and abdominal legs; as in the order of *Myriopoda.*

2. Where the head and thorax are closely united; and there are four pairs of legs attached to the thorax alone, as in the *Arachnida.*

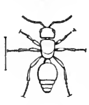
3. Where there are three distinct regions to the body; the head, thorax and abdomen, as in the *Insecta.* Moreover, the true insects have three pairs of legs attached to the thorax; and are, with few exceptions, winged.

The Myriopods grow by the addition of rings, after hatching from the egg; the Arachnids by frequent moultings of the skin; while the winged insects pass through a distinct metamorphosis. The young insect after being hatched from the egg is called the *larva*, from the Latin term meaning a *mask*, since it was the ancient belief that it concealed beneath its skin the form of the perfect insect. When full-fed the pupa-skin rapidly forms beneath the tegument, and the insect in that form escapes through a slit in the back of the larva. The perfect insect is often called the *imago.* The larval state of insects which resemble worms has also an analogous form to the Myriopods; so spiders are analogous to Crustacea, while reminding us of the pupa state of the winged insects.

Moreover, worms and crustacea are, generally speaking, aquatic, breathing by gills, while insects are terrestrial and breathe by pores in the side of the body which communicate with a complex system of air tubes, sometimes enclosed by blood vessels.

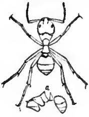
The order of winged insects is subdivided into seven divisions, occupying an intermediate rank between orders and families, and called by naturalists *suborders*.* Of these the *Hymenoptera* seem to be highest in the scale, and the *Neuroptera* the lowest.

Fig. 14.



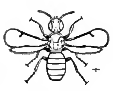
Mutilla.

Fig. 15.



Ant (*Formica*).

Fig. 16.



Chalcid Parasite.

Hymenoptera (Bees, Wasps, etc. Fig. 14, *Mutilla*; Fig. 15, Ant; Fig. 16, a Chalcid parasite) are known by their hard, compact bodies, distinct head and thorax, the small, narrow, irregularly veined wings, and by the possession of a hard ovipositor, often forming a poisonous sting. Their transformations are the most complete of all insects, the larva being most generally a white, footless, helpless grub, partly curved, and rapidly tapering at each end. The pupa has the limbs free, contained in a thin, silken cocoon. The species are all terrestrial.

Lepidoptera (Butterflies and Moths. Fig. 17, *Alypia*, or grape moth and caterpillar) have the mandibles obsolete, the maxillæ greatly prolonged and rolled up between the labial palpi; their bodies are covered with scales; and the broad, regularly veined wings are also covered with dust-like scales. Their transformations are complete. The active larvæ assume a worm-like form with several pairs (1–5) of fleshy false legs besides the thoracic ones; they spin silken cocoons before changing to pupæ (chrysalides, nymphs), with the exception of the butterflies. The limbs of the chrysalides are soldered together, and the abdomen is movable upon the head and thorax.

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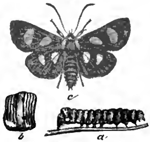
* Or, if preferred, these seven divisions may be regarded as orders, and the three "orders" of insects as subclasses.

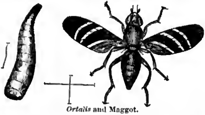
Fig. 17.



Alypia of Grape.

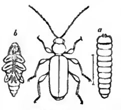
Diptera (Flies. Fig. 18, *Ortalis* fly and larva) have the mouth parts formed into a kind of proboscis; the second pair of wings are undeveloped, being reduced to a pair of pedicelled knobs serving as *balancers* or *poisers*. Their transformations are complete, the larvæ being maggots or elongated worm-like embryos. The pupæ often change within the skin of the larvæ, which serves as a cocoon. The limbs are free. Many of the species are aquatic. Here we first find wingless parasites.

Fig. 18.



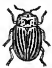
Ortalis and Maggot.

Fig. 19.



Asemum and young.

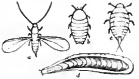
Fig. 20.



Potato Beetle.

Coleoptera (Beetles. Fig. 19, *Asemum* beetle, *a*, larva, *b*, pupa; fig. 20, Potato beetle) are known by their hard bodies, free and well developed mouth parts, and by the first pair of wings being hardened into sheaths (*elytra*) for the protection of the second pair. The larvæ, called *grubs*, often have a terminal prop-leg besides the thoracic or true-jointed legs, and pass by a complete metamorphosis to the imago state. The pupæ are often protected by a cocoon, and have their limbs free. Some of the species are aquatic. One family is parasitic, but is winged.

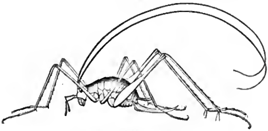
Fig. 21.



Orange scale insect.

Hemiptera (Bugs. Fig. 21, Orange scale insect, *a*, male, *b*, *c*, *d*, larva, female) have the mouth parts formed into a sucking tube. The first pair of wings are often thickened at the base and laid flat upon the abdomen, or are thin, somewhat net-veined, and inclined over the hind body. The transformations are incomplete, as in the Orthoptera. The species are largely aquatic. Some lower groups are true wingless parasites.

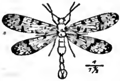
Fig. 22.



Hadenœcus of Mammoth Cave.

Orthoptera (Grasshoppers) have free mouth parts, and the organs of nutrition very highly developed. The first pair of wings are still partly hardened to protect the broad, net-veined hind pair which fold up like a fan upon the abdomen. The transformations are not complete, the larvæ and pupæ resembling closely the imagines, both being active. All the species are terrestrial. (Fig. 22 represents a wingless grasshopper, *Hadenœcus subterraneus*, Scudder, found in Mammoth Cave; other forms of this family occur in caverns.)

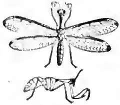
Fig. 23.



Panorpa.

Neuroptera (Fig. 23, Forceps tail, *Panorpa;* Fig. 24, *Mantispa*) have the mouth parts free again, the wings large and net-veined, the hind pair being often larger than the primaries. Their bodies are more elongated than those of other insects. The metamorphosis is incomplete, the larvæ and pupæ closely resemble the imagines, and are both active, and with few exceptions they are all aquatic. The different species present strong analogies to all of the other suborders. The wingless, lower genera present more analogies than other insects to the Myriopods.

Fig. 24.



Mantispa.

The order of *Arachnida* is divided into three suborders:—

Araneina, or spiders, which pass through no metamorphosis.

Pedipalpi, or harvest-men (*Phalangium*) and scorpions, which undergo no metamorphosis, and all agree in having the maxillary palpi enlarged and ending in a forceps, with the abdomen distinctly jointed, and the

Acarina, or mites, the young of which are usually born with but three pairs of feet, and in which the body is oval.

The order of *Myriopoda* is divided into the *Chilopoda*, of which the centipede is a type. In these each ring bears but a single pair of feet, and the body is flattened; while in the second division, the

Chilognatha, the body is cylindrical, and each segment appears to bear two pairs of legs. Of this group the thousand legs (*Julus*) is a type.

SPECIAL DIRECTIONS FOR COLLECTING INSECTS.

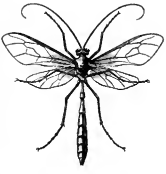
We now proceed to give more special directions for collecting and preserving insects of the different groups.

HYMENOPTERA.

BEES, WASPS, ICHNEUMON FLIES, GALL FLIES AND SAW FLIES.

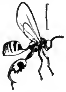
These insects are exceedingly abundant, and especial attention should be paid to collecting the smaller species. They should be pinned through the thorax, high up on the pin, and those that are not hairy collected in alcohol. The hairy species of bees should be pinned while in the net. The minute ichneumon flies should be gummed like small beetles upon cards, or preserved in small pill-boxes. The nests of bees, wasps and ants should be sought for and the entire colony with the young grubs captured and placed in spirits, while especial attention should be given to preserving the different sorts of parasites found in the nest. The nests in various stages of construction should be collected to serve as illustrations of insect architecture.

Fig. 25.



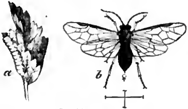
Ichneumon (Ophion.)

Fig. 26.



Chalcis.

Fig. 27.



Saw Fly and Larva.

The gall flies produce by their stings tumors or galls on the leaves or twigs of trees. Specimens of these galls accompanied by the insects that produce them are very desirable. They may be reared by simply placing the mature galls in pill-boxes.

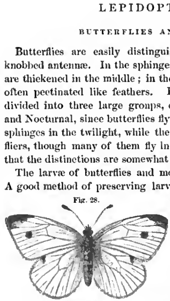
The larva of the saw fly (Fig. 27, *a*) closely resembles a caterpillar having several pairs of abdominal legs.

LEPIDOPTERA.

BUTTERFLIES AND MOTHS.

Butterflies are easily distinguished from moths by their knobbed antennæ. In the sphinges, or hawk-moths, the feelers are thickened in the middle; in the moths they are filiform and often pectinated like feathers. Lepidoptera have also been divided into three large groups, called Diurnal, Crepuscular and Nocturnal, since butterflies fly in the sunshine alone, most sphinges in the twilight, while the moths are generally night-fliers, though many of them fly in the daytime, thus showing that the distinctions are somewhat artificial.

Fig. 28.



Cabbage Butterfly.

The larvæ of butterflies and moths are called caterpillars. A good method of preserving larvæ dry, adopted at Dresden, is to squeeze out the intestines through a hole made near the anal extremity of the larva, then to insert a fine straw, after which it may be put in a glass vase, itself placed in a tin vessel and held over a lamp; the larval skin is blown while suspended over the lamp, by which the skin dries faster. It may be done with a small tube or blow-pipe fixed at the end of a bladder, held under the arm or between the knees, so as to leave the hands at liberty; and the straw which is inserted into the body of the larva may be fastened by a cross-pin stuck through the skin, and thus retained in its proper position throughout the process of blowing. The small larvæ, such as those of the Tineæ, may be put alive into a hot bottle, baked until they swell to the proper extent and dry, when they can be pinned with all their contents inside. (Westwood, Proceedings of the Entomological Society of London, Sept. 7, 1863.)

Dr. Knaggs has, in the "Entomologist's Monthly Magazine," given some directions for managing caterpillars. Very young caterpillars, which will not eat the food provided, and become restless, should be reared in air-tight jam-pots, the tops of which are covered with green glass to darken the interior of the vessel. When small larvæ hide themselves by mining, entering buds and spinning together leaves, they should have as small a quantity of food as possible. In changing larvæ from one plant to a fresh one, a slight jar or puff of breath will dislodge them, and they can be transferred to the jam-pot; or the glass cylinder, covered at one end with muslin, can be turned muslin end downwards for them to crawl upon. The duplicate breeding cage, pot or tube, should be "sweetened" by a free current of fresh dry air and then stocked with fresh food.

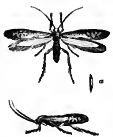
Dr. Knaggs advises that "hiding places," or bits of chips, etc., be provided for such Noctuid larvæ as naturally lie concealed, such as *Orthosia*, *Xanthia*, *Noctua*, etc., "while for *Agrotis* and a few others a considerable depth of fine earth or sand is necessary."

"Larvæ, which in nature hibernate, must either be stimulated by warmth and fresh food to feed up unnaturally fast, or else through the winter must be exposed to out-door temperature." For such larvæ as begin to eat before the trees are leaved out, the leaves of evergreens must be provided, pine leaves, chickweed, grasses and mosses. Hibernating, living larvæ must during the winter be kept dry, otherwise the damp seems to hang about their fur, and causes them to be attacked by a white fungus: while smooth larvæ require the natural dampness of the soil. Mr. Greene describes what he calls his "larvarium, viz.: a very large box, say three feet square and about the same in depth filled partly with mould covered with moss." The edges of the top of this box must be smoothly shaved to suit the lid, which is like the frame of a slate, the slate being knocked out. This is then covered with gauze. In a box of this size small branches may be held in bottles of water, and two or three dozen larvæ safely housed. If placed in a cool room, with plenty of air, they will grow almost as large as if in freedom. Mr. Gibson strongly recommends that during the winter all cages containing larvæ be placed in front of a window facing the east or northeast, so that the inmates may be kept as cool as possible.

When the moth is fairly out of the pupa, as remarked by Mr. Sanborn, their wings often fail to properly expand, on account of the want of moisture, "the insect being unable to expand its wings in a heated, dry room. He has avoided this difficulty by placing the insect just emerged, or about to come forth, beneath a bell-glass, within which he had placed moistened pieces of bibulous paper."

By taking advantage of the habit of many tree-feeding caterpillars of changing to pupæ (pupating) in the soil close to the trunk of the tree, many rare moths can with little trouble be raised from the chrysalides thus found. As the Rev. Joseph Greene (The Insect Hunter's Companion, London, 1870) advises, the dirt around the trunk should be dug up with a trowel, and carefully examined for chrysalides. He adds that "pupæ may be found almost anywhere and everywhere, under moss on large stones and bowlders, in the decayed stumps of old trees, behind the loose bark on palings, between dead leaves, under moss on banks, etc., etc."

Fig. 29.



In studying the interesting family of *Tineidæ* (Fig. 29), Stainton remarks that "the elongated wings, the slender body and the long or very long fringes to the wings, are characters by which the Tineidæ may generally be recognized at once; and the development of the palpi and their variety in form and structure, offer most tangible grounds for separating the greater number of the genera. Indeed, if the student will look at the head of a species to see whether it is hairy or smooth, if he will then notice the palpi, whether the maxillary palpi are developed and to what extent, and whether the labial palpi are slender, ascending or drooping, whether the second joint is densely clothed with scales, or bears a long protruding tuft, and if he will farther notice the form of the hind wings, which are either well rounded or very pointed, or indented towards the tip, he will be perfectly surprised to see how easily he will arrange these insects into genera by their structure."

The larvæ vary excessively in the number of legs, sixteen being the usual number, but in several genera (*Gracilaria*, *Lithocolletis*, etc.), we only find fourteen; in Nepticula, though the legs are but poorly developed, they number eighteen; on the other hand the larvæ of a few of the smaller genera (*Antispila*, *Tinagma*, etc.) are absolutely footless.

For collecting and preserving these minute and delicate moths, which are called by collectors, *Micro-lepidoptera*, especial instructions are necessary. When the moth is taken in the net, it can be blown by the breath into the bottom. "Then by elevating the hand through the ring, or on a level with it, a common cupping glass of about two inches in diameter, or a wine glass carried in the pocket, is placed on top of the left hand over the constricted portion, the grasp relaxed, and the insect permitted to escape through the opening into its interior. The glass is then closed below by the left hand on the outside of the net, and may be transferred to the top of the collecting box, when it can be quieted by chloroform" (Clemens); or the moths may be collected in pill-boxes, and then carried home and opened into a larger box filled with fumes of ether or benzine or cyanide of potassium. In pinching any moths on the thorax, as is sometimes done, the form of that region is invariably distorted, and many of the scales removed. In searching for "Micros" we must look carefully on the *lee side* of trees, fences, hedges and undulations in the ground, for they avoid the wind. Indeed, we can take advantage of this habit of many Micros, and by blowing vigorously on the trunks of trees start the moth off into the net so placed as to intercept it. This method is most productive, C. G. Barrett states, in the "Entomologist's Monthly Magazine," while a steady wind is blowing.

In seeking for the larvæ we must remember that most of them are leaf miners, and their burrows are detected by the waved, brown, withered lines on the surface of leaves, and their "*frass*" or excrement, thrown out at one end. Some are found between united leaves, of which the upper is crumpled. Others construct portable cases which they draw about the trunks of trees, fences, etc. Others burrow in the stems of grass, or in fungi, toadstools and in the pith of currant or raspberry bushes. Most are solitary, a few gregarious. A bush stripped of its leaves and covered with webs, if not done by *Clisiocampa* (the American tent caterpillar), will witness the work of a *Tortrix* or Tineid. Buds of unfolded herbs suffer from their attacks, such as the heads of composite flowers which are drawn together and consumed by the larvæ.

After some practice in rearing larvæ it will be found easier and more profitable to search for the leaf miners, and rear the perfect, fresh and uninjured moths from them. In this way many species never found in the perfect state can be secured.*

In raising "*Micro*" larvæ it is essential that the leaf in which they mine be preserved fresh for a long time. Thus a glass jar, tumbler or jam-pot, the top of which has been ground to receive an air-tight glass cover, and the bottom covered with moist white sand, will keep a leaf fresh for a week, and thus a larva in the summer will have to be fed but two or three times before it changes; and the moth can be seen through the glass without taking off the cover; or a glass cylinder can be placed over a plant inserted in wet sand, having the top covered with gauze. Dr. H. G. Knaggs, in treating of the management of caterpillars in breeding boxes, enumerates the diseases, besides muscardine and cholerine (and we might add pebrine) to which they are subject. Among direct injuries are wounds and bruises, which may be productive of deformities in the future imago; the stings of ichneumon flies, whose eggs laid either upon or in the body may be crushed with finely pointed scissors or pliers; frost bites; and suffocation, chiefly from drowning. If the caterpillar has not been more than ten or twelve hours in the water it may be recovered by being dried on a piece of blotting paper and exposed to the sun. Larvæ may also starve to death, even when food is abundant, from loss of appetite, or improper ventilation, light, etc.; or they may eat too much, become dropsical and die. Caterpillars undoubtedly suffer from a contagious disease analogous to low fever. Many die while moulting, especially the larvæ of butterflies, sphinges and bombycids; others are carried off by diarrhœa, which is generally caused by improper feeding on too juicy or relaxing food, when oak leaves or dry stunted foliage should be given them. To relieve constipation they should be fed with lettuce and other natural purgatives, and lastly, they may be attacked by fungi, especially, besides those previously mentioned, a species of *Oidium*. Such patients should be put in direct sunlight or dry currents of air. (Entomologist's Monthly Magazine, June, 1868.) The pupæ easily dry up; they should be kept moist, in tubes of glass closed at either end, through which the moth can be seen when disclosed.

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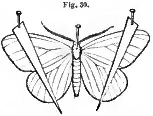
*"In general, it may be said, the mines of the leaf miners are characteristic of the genus to which the larva may belong. A single mine once identified, enables the collector to pronounce on the genus of all the species he may find thereafter. This, added to the ease with which the larvæ are collected, and the little subsequent care required to bring them to maturity, except to keep the leaves in a fresh and healthy state, makes the study of this group, in every respect, pleasant and satisfactory to the entomologist." (Clemens.)

In setting *Micro-lepidoptera:* "If the insect is *very small* I hold it by its legs between the thumb and finger of the left hand, whilst I pierce it with the pin held between the thumb and finger of the right hand; if the insect is not very small I use a rough surface, as a piece of blotting paper, or piece of cloth, for it to lie upon and prevent its slipping about, and then cautiously insert the point of the pin in the middle of the thorax, as nearly as possible in a vertical direction. As soon as the pin is fairly through the insect, remove it to a piece of soft cork, and by pressing it in, push the insect as far up the pin as is required.

Fig. 30.



"For setting the insects I find nothing answers as well as a piece of soft cork, papered with smooth paper, and with grooves cut to admit the bodies. The wings are placed in the required position by the setting needle, and are then retained in their places by a wedge-shaped, thin paper brace (Fig. 30), placed over them till a square brace of smooth card-board is placed over the ends of the wings." (Stainton.) A small square of glass can also be laid on the wings to keep them expanded, and thus serve the same purpose as the paper braces.

Linnæus first set the example of having the specific names of the Tortricids end in *ana* and of the Tineids in *ella*, and at the present day the rule is generally followed by entomologists, who have also given the same terminations to the names of the smaller species of *Pyralides*, such as *Pempelia*, *Crambus* and allied genera.

We may also add Lord Walsingham's directions for collecting *Micro-lepidoptera*, published in the "American Naturalist" (Vol. vi, No. 5.)

"I go out with a coat provided with large pockets inside and out, containing an assortment of pill-boxes, generally of three sizes, glass bottomed pill-boxes preferred, a bag slung over my shoulder, and a net. Unless searching for particular day flying species I prefer the last three hours before dark. As the sun goes down many species move which do not stir at other times. I watch the tops of the grass, the stems of the flowers, the twigs of the trees; I disturb leaves and low growing plants with a short switch and secure each little moth that moves, taking each out of the net in a separate pill-box, selected according to the size of the insect, as he runs up the net to escape. Transferring the full boxes to the bag I continue the process until moths cease flying or night sets in. Many species can be taken with a lamp after dark.

"Returning to camp I put a few drops of liquid ammonia on a small piece of sponge and place it in a tin canister with such of the boxes as do not contain the smallest species, and put these and the remainder away until morning in a cool place. In the morning I prepare for work by getting out a pair of scissors, a pair of forceps, my drying box containing setting boards, a sheet of white paper and some pins.

"First, I cut two or three narrow pieces of paper from three to six lines wide, or rather wider, according to the size of the largest and smallest specimens I have to set. I then double each of these strips and cut it up into braces by a number of oblique cuts. Now I turn out the contents of the canister and damp the sponge with a few drops of fresh ammonia, refilling with boxes containing live insects. Those which have been taken out will be found to be all dead and in a beautifully relaxed condition for setting. Had the smallest specimens been placed in the canister over night, there would have been some fear of their drying up, owing to the small amount of moisture in their bodies.

"If the weather is very hot there is some danger of killed insects becoming stiff while others are being set, in which case it is better to pin at once into a damp cork box all that have been taken out of the canister, but under ordinary circumstances I prefer to pin them one by one as I set them.

"Taking the lid off a box, and taking the box between the finger and thumb of the right hand, I roll out the insect on the top of the left thumb, supporting it with the top of the fore finger and so manipulating it as to bring the head pointing towards my right hand and the thorax uppermost. Now I take a pin in the right hand and resting the first joint of the middle finger of the right against the projecting point of the middle finger of the left hand to avoid unsteadiness, I pin the insect obliquely through the thickest part of the thorax so that the head of the pin leans very slightly forward over the head of the insect. After passing the pin far enough through to bring about one-fourth of an inch out below,* I pin the insect into the middle of the groove of a setting-board so that the edge of the groove will just support the under sides of the wings close up to the body when they are raised upon it. The board should be chosen of such a size as will permit of the extension of the wings nearly to its outer edge. The position of the pin should still be slanting a little forward. The wings should now be raised into the position in which they are intended to rest, with especial care in doing so not to remove any scales from the surface or cilia of the wings. Each wing should be fastened with a brace long enough to extend across both, the braces being pinned at the thick end, so that the head of the pin slopes away from the point of the brace; this causes the braces to press more firmly down on the wing when fixed. The insect should be braced thus: the two braces next the body should have the points upwards, the two outer ones pointing downwards and slightly inwards towards the body, and covering the main portion of the wings beyond the middle. Antennæ should be carefully laid back above the wings, and braces should lie flat, exercising an even pressure at all points of their surface. The fore wings should slope slightly forwards so that a line drawn from the point of one to the point of the

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*The English mode of pinning low down on a short pin presents so many disadvantages that we would caution collectors to pin high up on a long pin so that three-fourths of its length should project below the body.—*Editor.*

other will just miss the head and palpi. ' The hind wings should be close up, leaving no intervening space, but just showing the upper angle of the wing evenly on each side. I can give no more precise directions as to how this desirable result may most simply and speedily be attained; no two people set alike. Speed is an object; for I have often had to set twelve dozen insects before breakfast. A simple process is essential, for a man who is always pinning and moving pins, and rearranging wings and legs, is sure to remove a certain number of scales and spoil the appearance of the insect, besides utterly destroying its value. I raise each of the fore wings with a pin and fix the pin against the inner margin so as to keep them in position while I apply the braces. Half the battle is really in the pinning. When an insect is pinned through the exact centre of the thorax with the pin properly sloped forward, the body appears to fall naturally into its position on the setting-board, and the muscles of the wings being left free are easily directed and secured: but if the pin is not put exactly in the middle, it interferes with the play of the wings. Legs must be placed close against the body or they will project and interfere with the set of the wings. Practice, care and a steady hand, will succeed. When all the insects that have been killed are set, the contents of the canister will be found again ready, twenty minutes being amply sufficient to expose to the fumes of ammonia. Very bright green or pale pink insects should be killed by some other process, say chloroform, as ammonia will affect their colors.

"Insects should be left on the setting-boards a full week to dry; then the braces may be carefully removed and they may be transferred to the store box.

"Having given some account of the process each insect goes through, I will say a word as to the apparatus required.

"First as to nets. The simplest net is a strong, circular, iron wire hoop with a bag of book muslin attached, fastened into a light deal or other handle.

"I use a small pocket net about nine inches in diameter made to fold up, with a jointed wire frame and a screw to fit into a brass socket in a short cane handle. To counteract the strain of the net upon so slight a frame the three wire joints are made flat, the two side joints flattened across the strain, the upper one the reverse way; but to prevent this upper joint from coming into play when the net is fixed, the upper part of the screw which holds the frame to the handle is welded square and fits a corresponding square socket in the other end of the wire frame, holding all tight when screwed down. A small green silk or other net can be slipped on or off this frame as required.

"An umbrella net with stout steel rim and canvas edging is useful for sweeping tall grass and herbage, or to beat branches into, by which means many small and beautiful species of retired habits may be obtained.

"I use pill-boxes with glass bottoms, which can be obtained of various sizes. They are convenient in admitting of the examination of each specimen, so rare species can be especially searched for, and damaged ones permitted to escape; but they are expensive and for ordinary purposes card-board boxes answer sufficiently well. It is a good plan at the beginning of a season to strengthen all your boxes by a crossed strap of tape or calico firmly glued at the top and bottom. For a killing box any tin box or canister with a closely fitting lid, capable of containing one hundred pill-boxes will be found to answer.

"Setting-boards can be bought ready made of the smallest sizes. They are made by gluing a strip of thick cork on a thin slip of deal; the cork must be thick enough to enable a groove to be cut into it, deep enough to hold the bodies of the insects to be set, and to leave sufficient depth for the pin to hold firmly without reaching the deal. The cork on each side of the groove should be smoothed off with a gentle curve, so that the wings dry in a good position. The deal backing projects beyond the cork so as to slide into a groove if required, and it is convenient to have a deal cupboard of drying boxes with handle at top and perforated zinc door, having grooves on each side into which the setting boards can be slid. Each board should be papered with thin white paper.

"At the beginning of a season setting-boards may be washed or brushed over with advantage with a weak solution of oxide of zinc; it fills up old pinholes and makes them look clean.

"For *Tortricina* use No. 10 pins; for *Tineina* (small), No. 19; for *Nepticulæ*, No. 20.

"Always set your insects as soon as you kill them, they are then much more easy to set and retain their position better when dry.

"When pill-boxes are filled keep them cool to prevent the insects from fluttering; if glass boxes, keep them also in the dark.

"Many species when first taken will flutter in the boxes and injure themselves; for these it is well when collecting to carry a small phial of chloroform and a zinc collecting box cork-lined, into which you can at once pin your captures; the cork should be damped to keep them fresh. Touching a pill-box with a finger moistened with chloroform will kill the insect inside. Too much chloroform is apt to stiffen the nerves of the wings and interfere with setting.

"By breeding *Microlepidoptera*, many species not otherwise easily obtainable may be added to a collection, and the habits of others in the larva state may be studied with much interest. For this purpose a few wide-mouthed glass bottles should be obtained with corks to fit, so that the small larvæ can be placed in them with fresh food and the food kept fresh by exclusion of air. If mould should appear the cork can be replaced by muslin or net tied over. I would hardly advise a travelling collector to attempt this method although I have adopted it with some success, but in a stationary camp it is most interesting and comparatively easy.

"Cork-lined store boxes are of course required into which to remove the insects when sufficiently dried on the setting boards. These, as well as the pins and setting-boards with drying case to hold them, and the net frames of the folding and umbrella patterns, will be best obtained from some dealer in such things.[*]

"To pack *Microlepidoptera* for travelling, pin them firmly close together into a cork-lined box, so that each specimen just gently holds down the body of the one above it. This cannot be done with very minute species. Put your box into another larger box and let the outer one be sufficiently large to leave a good clear six inches all around the inner one. Pack this intervening space with hay not crammed too tight; it will act as a spring and reduce the effect of shaking; the whole parcel should be made thoroughly secure against damp."

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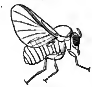
[*] In London there are several, among whom I would mention T. Cook, New Oxford Street, and Thomas Eedle, Maidstone Place, Hackney Row. The manufacturers of entomological pins, which can, however, be obtained from the above dealers, are Messrs. Eddleston & Williams, Birmingham; Messrs. Kirby & Beard, Cannon Street, London. In America, The Naturalists' Agency, Salem, Mass., and C. G. Brewster & Co., Washington St., Boston, keep on hand insect pins, cork, pill-boxes, and most of the other articles required by the collector.

DIPTERA.

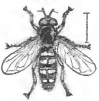
FLIES, MOSQUITOES, BOT FLIES, ETC.

Fig. 31.



Black Fly.

Fig. 32.



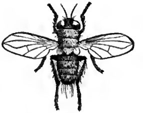
Syrphus Fly.

There are about 2,500 species of North American flies described, and it is probable that the number of living North American species amounts to 10,000. In Europe there are also about 10,000 known species, belonging to about 680 genera.

The flies of this country, compared with the other groups, have been but little studied, though the habits of many are so interesting and the species very numerous. The different parts of the body vary much more than in the Hymenoptera and Lepidoptera, and in such a degree as often to afford comparatively easy characters for discriminating the genera.

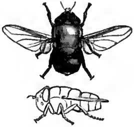
Their habits are very variable. Fresh water aquaria are

Fig. 33.



Tachina Fly.

Fig. 34.

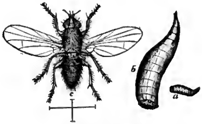


Bot Fly.

necessary for the maintenance of aquatic larvæ. If quantities of swamp mud and moss with decaying matter are kept in boxes and jars, multitudes of small flies will be hatched out. Leaf-mining and seed-inhabiting species can be treated as *Microlepidoptera*, and earth-inhabiting larvæ like ordinary caterpillars. Dung, mould in hollow trees, stems of plants and toadstools, contain numerous larvæ or maggots (Fig. 35) as the young of flies are called, which must be kept in damp boxes.

Flies can be pinned alive, without killing them by pressure, which destroys their form; and numbers may be killed at once by moistening the bottom of the collecting box with creosote, benzine or ether, or putting them into a bottle with a wide mouth, containing cyanide of potassium. Minute species can be pinned with very slender pins, or pieces of fine silver wire, and stuck into pieces of pith, which can be placed high up on a large pin. In pinning long-legged, slender species, it is advisable to run a piece of card or paper up under their bodies upon which their legs may rest, and thus prevent their loss by breakage. Of these insects, as of all others, duplicates in all stages of growth should be preserved in alcohol, while the minute species dry up unless put in spirits.

Fig. 35.



Onion Fly and Maggot.

COLEOPTERA.

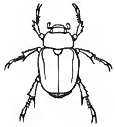
BEETLES.

"Coleopterous insects may be distinguished by the hard shell which incases their bodies; the wings are protected by horny wing covers, but in some the wing covers are small.

It is through the right wing cover (Fig. 9) that they should be pinned for the cabinet. They are found in every variety of situation; on plants, in decomposing animal and vegetable matter, in mushrooms, under bark of trees, under stones, especially in moist and shady situations; many are found creeping on the ground, in deserts and other arid spots in western America; some are attracted by candles at night, while others (in all parts of the country) fly actively on being approached and light again on the ground a few paces off.

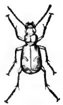
"Many peculiar species, not found in other situations, live under material cast up by the ocean; others are found along the shores of lakes and rivers; many also are found living in the water." (Leconte.)

Fig. 36.



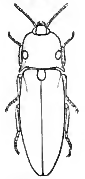
Goldsmith Beetle.

Fig. 37.



Tiger Beetle.

Fig. 38.



Fire Fly.

Mr. Edward Newman says that "moss is a great resort of beetles in the winter; whenever you have the opportunity go into the thickest woods, and pulling up the moss by handfuls cram it into a canvas bag, which you have taken with you for this especial object. Then on a winter's day, when nothing tempts you abroad, shake out your moss, bit by bit, on a white cloth, and you will soon possess yourself of wonders."

"A large number of species are very minute, and are usually found in abundance; these should not be neglected, as to scientific men they possess quite as much interest as the larger species. The specimens should be thrown into strong alcohol;

Google

if this cannot be procured, common whiskey will answer very well, but must, when the specimens are numerous, be replaced by fresh liquor. The smaller specimens should be kept in a separate bottle. When the bottle is full, the liquor should be poured off and replaced by fresh alcohol or whiskey, and closely corked. If there is much danger of breaking in transportation, the specimens, after being well soaked with the alcohol, may be allowed to dry partially, but not so as to become brittle, and then packed in small pasteboard boxes, taking care, by shaking the box well before finally closing it, to pack the specimens so closely that they cannot be broken by moving about; the box may then be closed by pasting a small strip of paper around it, and the locality, date of collection, etc., written on the top." (Leconte.)

We copy from a chapter on collecting Coleoptera, by Edward Newman, in Greene's "Insect Hunter's Companion" (London, 1870), an account of Mr. Crotch's plan of killing and preserving beetles, of especial use while on a long journey.

"The following method has now been in use some time, and hence has been fairly tested. Its advantages are very great, so that I make no apology for introducing it to the notice of your readers. The first idea of the process is due, as far as I know, to M. de Vuille-froi, who used it with me in Spain, some years ago, with great success. The specimens may be collected in two ways, according to the size and the convenience of the collector. The first and best way, for small species, is by putting them into a bottle containing about half an inch of dry pine-sawdust, in which has been previously placed a small piece of cyanide of potassium about as big as a pea: they will then die instantly. Larger species and small species which do not fly readily, may be put into spirits in the ordinary way, but the *Staphylinidæ* and others generally open their wings in this process. The sawdust should be pine-wood and sifted free from chips on the one hand and from dust on the other, so as to be of an uniform size. For storing the species thus collected, a few tin canisters will be found most convenient; a layer of sawdust is placed at the bottom, and then beetles and so on alternately to the top. The sawdust used in the tins should be damped (not *wetted*) with a mixture of spirit and one-twentieth part of carbolic acid, which will effectually prevent mould or mites and will bring the specimens home perfectly fresh and clean. Small species, or specimens from a particular locality, should be wrapped in a piece of rag or tissue-paper, with a little sawdust, and the name of the locality. The specimens collected in spirits should be removed as soon as possible (in a few days at farthest), and transferred to sawdust. When the tins are full, some more spirit and carbolic acid should be poured in and the top soldered down: they will then keep for two years at least. The advantages of this method are manifest, especially in the absence of any danger of breakage or leakage; and it is more than probable that a similar plan might be employed with reptiles, fishes, etc., but for these chloride of zinc suggests itself as the agent most likely to be of service. As the insects do not become rotten by the above process, it is sometimes not so easy to set their legs in the peculiar manner in vogue in this country, but they will have as a set-off the advantage of being thoroughly fit for study. When by any chance spirit cannot be obtained, they will keep perfectly in dry sawdust, if the specimens are dried in the air for a few hours first; all that is necessary afterwards being to relax them in the sawdust instead of removing them from it. Jars or wide-mouthed pickle bottles may of course be used instead of tins, and are more airtight, but liable to break."

"That eminent and most excellent entomologist, Mr. E. W. Janson, endorses Mr. Crotch's recommendation, and adds a few hints on the subject of collecting beetles abroad, as follows:—

"'The sawdust plan, now almost universally adopted by collectors, I can recommend both on account of its simplicity and efficiency. The sawdust should be that of some white or yellow wood without coloring matter — pine is perhaps the best; it should be sifted over fine muslin, and the dust and minute particles rejected. In collecting, wide-mouthed bottles should be used; these should be about one-fourth filled with dry sawdust, adding beneath a piece of cyanide of potassium of the size of a large pea or haricot bean. On reaching home after collecting, the contents of the collecting bottles should be shaken out on a large sheet of paper, and the insects transferred to the stock-bottle or jar, and the cyanide and sawdust returned to the collecting bottles for future use. Any description of wide-mouthed bottles, such as pickle-jars, may be used as stock bottles; they should, however, have tightly-fitting corks or bungs. Before putting the insects collected into the stock bottle, throw into it sawdust a quarter of an inch in thickness, *slightly damped*, not *moistened*, with a mixture made of alcohol (methylated spirit will answer admirably; brandy or strong whiskey, if unsweetened, will suffice, but sweetened gin and rum must be avoided), or, still better, benzine or benzoline, and carbolic or phenic acid. These should be mixed in the proportions of nineteen parts of alcohol or benzine and one part of carbolic acid. On the sawdust damped with this mixture place a layer of insects; over them a second stratum of damped sawdust, then a second layer of insects, and so on alternately until the stock-bottle or jar is filled; take care that it is always kept well-closed. When it is filled it may be packed with any other objects in sawdust, hay, moss, or any other elastic substance, and forwarded to its destination.'"

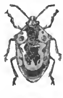
Special attention should be given to the collection of the larvæ of beetles, called grubs. They are found in soil, under the bark of trees, in nuts, etc., and in fresh water pools.

HEMIPTERA.

BUGS, PLANT LICE, BARK LICE, LICE.

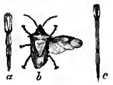
This group of insects has been greatly neglected, as they are not the favorites of entomologists. By sweeping grass

Fig. 39.



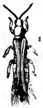
Stiretrus.

Fig. 40.



Arma.

Fig. 41.

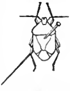


Thrips.

and herbage, as for beetles, in the latter part of summer, large numbers occur which can only be obtained in this way. Hibernating species are found under leaves in hard-wood forests. The large carnivorous kinds are sometimes found on bushes with caterpillars transfixed on their jaws. Aquatic species should be taken out by the water-net by thrusting it suddenly under surface swimming species, or by pushing it among submerged grass or weeds where the smaller forms may be lurking; several kinds occur under submerged logs, sticks, etc.

The soft-bodied species of *Aphis* or plant lice should be preserved in alcohol, glycerine or Canada balsam. They should be carefully watched for their parasites, and can be easily kept in slender glass vials through which they can be watched.

Fig. 42.



All the bugs should be pinned through the distinct triangular scutellum situated in the middle at the base of the wings (Fig. 42). The small hard species of leaf hoppers should be pinned through the right wing cover. Birds and various quadrupeds should be carefully examined for lice which may be preserved in alcohol.

ORTHOPTERA.

GRASSHOPPERS.

Orthoptera can be easily preserved in strong alcohol, and may afterwards be taken out and pinned and set at leisure. If preserved dry they can be killed with cyanide of potassium, or ether, without losing their colors, as they would do after remaining long in alcohol. They should be pinned through a little triangular spot between the bases of the elytra, or fore wings, when the wings can be spread to advantage. They are also often pinned through the right elytron, as in Coleoptera. In pinning these insects for transportation care should be taken to put in additional pins crossing each other on each side of the abdomen, and in like manner to steady the hind legs, which are very apt to fall off if too much jarred.

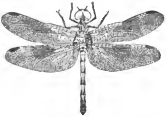
NEUROPTERA.

DRAGON FLIES, MAY FLIES, CADDIS FLIES, ETC.

These insects, the young of which frequently live in fresh water ponds and streams, should be pinned through the centre of the thorax, the smaller and more delicate kinds immediately on capture should be pinned in the collecting box.

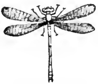
The Psoci (Fig. 45, *Cœcilius*) live on leaves and the bark of trees, and are more or less social. They closely resemble the *Aphis*.

Fig. 43.



Libellula (Dragon Fly).

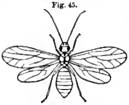
Fig. 44.



Agrion.

As regards the preservation of the dragon flies, Mr. Uhler states that "the large, brilliant green dragon flies (*Cordulina*), as well as the yellow, brown-striped *Gomphina*, having the eyes wide apart, will furnish new species in almost all parts of the country. In order to preserve specimens in the neatest manner it is well to slip them immediately, when caught, into paper bags of suitable size; first taking care to lay back the wings so that they will be applied together, to prevent mutilation. These paper bags may be placed loosely in a box carried for the purpose. They can thus be taken out at leisure, killed by applying a camel's hair pencil, dipped in sulphuric ether, chloroform, or benzine, to the under side of the body, and then have the wings spread by placing them upon the setting boards. In most species the colors change after death,

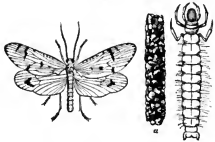
Fig. 45.



Cœcilius.

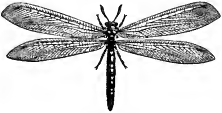
hence it is important to make short descriptions of the colors before killing the specimens." The smaller, more slender and delicate Neuroptera should be pinned directly in the collecting box. Many species are caught by a light in the night time, such as *Polystoechotes nebulosus* and the Caddis flies (Fig. 46, *Neuronia semifasciata*); and a bright light placed in damp situations by streams, etc., will attract large numbers, the smaller species, like moths, being attracted a great distance by light. Other species of this group, so numerous in the northern states, are found in great numbers floating on lakes and ponds. For the proper study of the genera of these insects, and often of the species, they should be collected in alcohol, so as to be studied in a flexible state.

Fig. 46.



Caddis Fly and Larva and its Case.

Fig. 47.

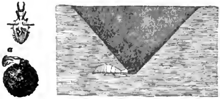


Ant-lion, adult.

The aquatic larvæ and pupæ can be reared in aquaria in jars and tumblers, taking care that the weaker species are separated from those more powerful and bloodthirsty. The little Entomostraca, or water fleas serve as food for the smaller species. With care many species can be reared in this way, and so little is known of their transformations that figures and descriptions would be of great value. The interesting and varied habits of the different families can also easily be noted.

The Ant-lions (Fig. 47) in the larva state (Fig. 48) dig pitfalls in the sand. The adults may be preserved in the same manner as Dragon flies.

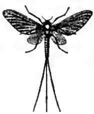
Fig. 48.



Ant-lion.

The May flies, or Ephemerids (Fig. 49), as their name implies, are, when fully grown, very short-lived insects, the adult living but a few hours. The body is slender and weak, being very long; the prothorax is of moderate size; the antennæ are subulate, awl-like, being very small, as in the dragon flies, while the parts of the mouth are rudimentary, the insect taking no food in the adult or imago state. The wings are very unequal in size, the hinder pair being much smaller, or in some instances (*Chloë* and *Cœnis*) entirely aborted; the transverse veins are either few or numerous; the tarsi are four or five jointed, and appended to the long, slender abdomen are two or three long caudal filaments.

Fig. 49.

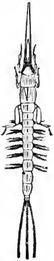


May Fly.

The sexes unite while on the upper surface of the water, and after a short union the female drops in the water her eggs "in two long, cylindrical yellow masses, each consisting of numerous minute eggs." Walsh states that he possesses a "subimago of *Palingenia bilineata*, which oviposited in that state."

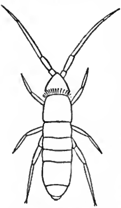
The larvæ live in running water and prey on small aquatic insects, the body being long and flat, with long hair-like antennæ, and small eyes situated on the side of the head, the ocelli not usually being present, and long sickle-shaped jaws, while along each side of the abdomen are leaf-like or bushy false gills, and the body ends in long feathered anal hairs. They live, it is stated, two or three years, and reside in burrows in the mud, under stones, or among grass and weeds, where they may be taken with the water-net in great abundance, and are beautiful objects for the aquarium. Lubbock states that *Chloëon* passes through twenty-one moultings of the skin before it assumes the imago state; the pupæ are active and have, as a general rule, the rudiments of wings. After leaving the pupa skin the insect (sub-imago), when its wings are expanded, takes a short flight, and then casts another skin before reaching the final imago state. They often fly in immense numbers, and become stranded in winrows along the borders of lakes. The perfect insects should be preserved in alcohol for study, as they shrivel up when pinned. They should be described when alive if possible.

Fig. 50.



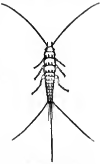
Ephemera larva.

Fig. 52.



Podura (*Tomocerus*).

Fig. 51.



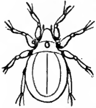
Lepisma 4-seriata.

The *Thysanura*, comprising the Lepisma (Fig. 51, *Lepisma 4-seriata* or Bristle Tail, and Podura or Spring Tail; Fig. 52, *Tomocerus plumbeus*) are found abundantly in damp apartments, or in moist dark places under sticks, stones, among fallen leaves, or under bark of trees, while some occur in great profusion about manure heaps and hot-beds in early spring. They should be collected in a mixture of alcohol and glycerine, equal parts, or alcohol alone. Collections from the western and Pacific states are very desirable.

ARACHNIDA.

SPIDERS, SCORPIONS AND MITES.

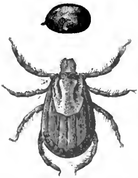
Fig. 53.



Nothrus Mite.

In studying spiders, of which there are in New England alone, according to Mr. Emerton, over two hundred species, the number and relative situation of the eyes, and the relative length of the different pairs of legs, should be noticed. Their webs and the manner of constructing them; their habitats, whether spreading their webs upon or in the ground, or in trees, or on herbage; or whether the species is aquatic, or erratic, and pursue their prey without building webs to entrap them, should be observed. So, also, how they deposit their eggs, and the form and appearance of the silken nidus, and whether the female bears her eggs about her, and how this is done, whether holding on to the egg-sac by her fore or hind legs, should all be carefully noticed. Care must be taken not to mistake the young or full-grown, mature species, and describe them as such. Spiders can be reared in boxes as insects. The only way to preserve them is to throw them into alcohol; when pinned, they shrivel up and lose their colors, which keep well in spirits.

Fig. 54.



Cattle Tick.

The colors of spiders vary much at different seasons of the year, especially during the frosts of autumn, when the changes produced are greatest. All spiders are directly beneficial to agriculture by their carnivorous habits, as they all prey upon insects, and do no harm to vegetation. Their instincts are wonderful, and their habits and organization worthy of more study than has yet been paid them. We have no species poisonous to man, except when the state of health renders the constitution open to receive injury from their bite, just as mosquitoes and black flies often cause serious harm to some persons.

The mites (Fig. 53, *Nothrus*) occur under bark, sticks, stones, or on the bodies of birds and mammals or insects. They should be preserved in alcohol.

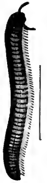
All kinds of Ticks (*Ixodes*, Fig. 54) should also be preserved in spirits, as well as the minute species of mites which occur everywhere.

MYRIOPODA.

CENTIPEDS, THOUSAND LEGS, MILLEPEDS.

The centipeds and millepeds (Fig. 55, *Julus multistriatus*) live in damp situations under stones, sticks, leaves, etc. They should be preserved in different stages of growth in spirits. Several species (*Spirostrephon*) live in caves and should be especially sought for.

Fig. 55.



Julus.

In conclusion we may say that while the Coleoptera, Lepidoptera, and Hymenoptera of the northeastern states of the union are comparatively well known, specimens of all orders from the southern and western states, the Pacific states, and the great plains, *however common*, are eagerly desired, as well as all cave insects. Specimens received by the Smithsonian Institution will be forwarded to experts for identification and description. Specimens should always be accompanied by small paper labels attached to the pin or placed in the bottles. If written in pencil on heavy paper the marks will endure for a long time. Always state the locality and date of capture.

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SMITHSONIAN MISCELLANEOUS COLLECTIONS.
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NEW SPECIES
OF
NORTH AMERICAN COLEOPTERA.

PREPARED FOR THE SMITHSONIAN INSTITUTION.

BY
JOHN L. LECONTE, M.D.

PART II.

WASHINGTON:
SMITHSONIAN INSTITUTION:
MAY—JUNE, 1873.

ASEMUM Esch.

482. A. nitidum. Atrum nitidum, breviter fusco-pubescens, prothorace latitudine breviore, lateribus valde rotundatis, disco subtiliter minus dense punctato, ante basin transversim, disco autem vix conspicue impresso; elytris subtiliter dense punctulatis, obsolete striatis. Long. 17.5 mm.

One male, Oregon, Lord Walsingham. This species is larger, and somewhat more robust than either *moestum* or *atrum*, and is easily known by the surface being lustrous instead of opaque, and by the prothorax being much less densely punctured. The antennæ of the male are half as long as the body and stouter than in the other species, especially towards the base. The eyes are of the same form, and somewhat hairy as in the other species.

Asemum asperum Lec. belongs properly to Nothorhina, a genus easily distinguished by the prosternum being more deeply emarginate in front, pronotum longitudinally excavated in the middle, and rough with elevated points at the sides.

CRIOCEPHALUS Muls.

"The vaguely described North American species introduced by Kirby, Randall, and Leconte," do not seem to have merited the recognition of Schiödte,* and I have therefore constructed the following table, which may assist in the determination of specimens.

Some of the characters used by Prof. Schiödte for the separation of the two Danish species, become, in our more extensive fauna, of importance in defining groups rather than individual species, which may accordingly be divided as follows:—

A. 3d joint of hind tarsi emarginate for half its length, the 4th joint consequently extending as far as the lobes of the 3d joint, elytra finely punctured:

Antennæ and legs very slender, hind tarsi with the 3d joint twice as long as wide; body more elongate, prothorax not wider than long, rounded on the sides, slightly roughened with elevated points.
1. PRODUCTUS *Lec.*

Antennæ and legs less slender, body less elongate, prothorax wider than long:

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* Annals and Magazine of Nat. History, 3d ser. xv. 233. (March, 1865.)

3d joint of hind tarsi two-thirds longer than wide, prothorax rounded at the sides and slightly roughened. 2. AGRESTIS (*Kirby*).

3d joint of hind tarsi half longer than wide, prothorax angulated at the sides, and strongly roughened. 3. ASPERATUS *Lec.*

B. 3d joint of hind tarsi bilobed, cleft nearly to the base, the 4th joint received into the emargination, not extending as far as the end of the lobes; elytra less finely punctured, (sides of prothorax rounded, scarcely asperated):

Prothorax deeply impressed, hind tarsi with 3d joint nearly twice longer than wide. 4. MONTANUS, n. sp.

Prothorax feebly impressed, hind tarsi with 3d joint very little longer than wide;

Prothorax very finely punctured. 5. OBSOLETUS (*Rand.*).

Prothorax less finely punctured. 6. NUBILUS *Lec.*

C. Eyes smaller, less prominent, and more deeply emarginate than in the other species, prothorax and elytra finely punctured, the former rounded, not asperated, feebly impressed at the middle; 3d joint of hind tarsi . . . . . . 7. AUSTRALIS *Lec.*

483. C. montanus.

This species is founded on four specimens from Colorado, having very much the appearance of *C. productus*, but differing by the 3d joint of hind tarsi cleft nearly to the base, and by the less finely punctured elytra. The prothorax is scarcely wider than long, rounded on the sides, with only a few elevated points, finely and densely punctured, with the two discoidal impressions, the medial channel, and two tranverse impressions deep. The hind tarsi are slender, the 2d joint is more than twice as long as its width, and the 3d is about half longer than its width, cleft nearly to the base. The antennæ of the ♂ are about three-quarters as long, those of the ♀, one-half as long as the body. The ventral sexual characters are as in the other species, the 5th segment being broad in the ♂, elongate in the ♀; in the ♂ the 6th segment is visible. Length 19–24 mm.

7. *C. australis* Lec., Pr. Ac. Nat. Sci., Phil. 1862, 43; *Asemum australe* Lec., Journ. Ac. Nat. Sci. Phila., 2d ser., ii. 35. I have seen only the type of this species, which on account of the finer punctuation, and general appearance, I placed in Asemum from which it differs by the eyes being larger, more coarsely granulated, and not hairy.

GONOCALLUS Lec.

Body elongate, slender, thinly pubescent, with long flying hairs on the antennæ, legs, prothorax, body, and elytra; integuments of firmer consistence than usual in the tribe; front short, oblique, channelled, divided by a deep transverse line, support of labrum coriaceous as usual. Eyes finely granulated, deeply emarginate; genæ short, prominent, rectangular. Palpi short, not very unequal, last joint broadly triangular; antennæ slender, thinly clothed with long pubescence, and sparsely villous; scape rather stout, more than half as long as 3d joint, 2d joint about one-fourth as long as 3d joint; 4th joint a little shorter than 5th joint; 11th in ♀ simple, in ♂ very distinctly divided, outer portion shorter. Prothorax shining, sparsely punctured, sides distinctly angulated at the middle. Elytra elongate, densely punctured, rounded at tip. Prosternum narrow between the front coxæ, which are transverse and broadly angulated. Mesosternum triangular, obtusely rounded behind, coxæ distant, open externally; episterna of metathorax not very wide, nearly parallel, tubercle of scent pores very distinct; 5th ventral segment shorter in ♂ and broadly emarginate. Legs slender, thighs very feebly clavate, hind tibiæ with distinct spurs, tarsi shorter than tibiæ, 1st joint as long as the two following united.

A very anomalous genus, founded on *Callidium collare* Kirby (lepidum *Lec.*), a slender black species with bright red prothorax, found in Canada, and on Lake Superior. By the greater firmness of the tissues, the general appearance, the presence of an additional article in the ♂ antennæ, and the smaller size of the 2d joint, it forms a connecting link with the later tribes allied to Clytini; but by the broadly angulated front coxæ it belongs rather to the Callidiini.

The eyes are more inclined to embrace the base of the antennæ than in any other genus of the Callidioid series, and it is rather to avoid making a new group in the Cerambycoides than for any other reason that I have placed it here.

GRACILIA Muls.

484. G. fasciata. Nigra opaca, subtiliter pubescens, prothorace latitudine fere duplo longiore, medio paulo latiore, alutaceo parce punctato; elytris fortiter punctatis, margine basali fasciaque transversa mox pone medium albo-pubescente, apice truncatis, et 3 vel 4-denticulatis; pedibus piceis, antennis flavo-testaceis. Long. 4·5 mm.

Lower California, Mr. Ulke. A singular species, but resembling entirely in form and size *G. minuta.* The elytra are distinctly truncate at tip, and the truncature is serrate, the suture and outer angle being prominent, with one or two intermediate cusps.

CALLIDIUM Fabr.

485. C. vile. Nigrum, subtiliter cinereo-pubescens, prothorace latitudine vix breviore, lateribus rotundatis, fortiter punctato; elytris sat dense fortiter punctatis, et transversim rugosis; antennarum articulo 2do sequente triplo breviore. Long. 4·5 mm.

Mendocino, California; collected by Mr. Behrens. Readily known by the small size, black color, and coarse sculpture. The thighs are strongly clubbed, the front coxæ are contiguous, and the mesosternum obtusely triangular. I cannot see the mesonotum, but I have no doubt from the other characters that there is no stridulating surface.

486. C. hirtellum. Elongatum minus depressum, nigrum nitidum, pubescens, et pilis nigris erectis villosum, prothorace ferrugineo, punctato, callis lævibus haud elevatis ornato, latitudine paulo breviore, lateribus rotundatis; elytris concinne punctatis sæpe testaceis; antennis pilosis, basi rufescentibus, articulo 2do 3io dimidio breviore. Long. 8 mm.

Nevada, Mr. Ulke. Two specimens, one of which is black, with the prothorax ferruginous; the other has also the elytra brownish ferruginous. The mesonotum is smooth and polished, with a few scattered punctures; the mesosternum is triangular; the thighs strongly clubbed, the front coxæ contiguous. *C. æreum* Newman (pallipes *Hald.*), belongs to the same division of the genus, characterized by the rather stout antennæ, not thickened but very hairy towards the base, with the 2d joint about half as long as the 3d, and the punctuation less dense than in the metallic blue species.

XYLOCRIUS Lec.

487. X. cribratus. Ater, pube nigra villosus, prothorace fortiter punctato, latitudine breviore, postice subangustato, lateribus antice valde rotundatis, postice subsinuatis; elytris subreticulatim grosse punctatis, punctis versum apicem paulo minoribus. Long. 12·5 mm.

One male, Virginia City, Nevada, Mr. Edwards. Nearly allied to *X. Agassizii* Lec., but the prothorax is distinctly narrowed behind and subsinuate, very much as *Spondylis upiformis*, and the sculpture of the elytra is not suddenly finer behind the middle.

The convex sides of the prothorax are less coarsely and more densely punctured than the disk. The antennæ are two-thirds the length of the body, quite hairy, and the 4th joint is very little shorter than the 5th.

GANIMUS Lec.

Head moderately large, eyes coarsely granulated, deeply emarginate, lower lobe very large, genæ extremely short, front short. perpendicular; mandibles short, stout, acute at tip, external outline with a well-defined obtuse angle near the tip, so that the front margin is straight and transverse; palpi very unequal, last joint triangular, obliquely truncate. Antennæ (♂) longer than the body, 11th joint indistinctly divided; 1st joint thicker, and about two-thirds as long as the 3d joint, very rough with small acute spines, 3d and following rough but gradually becoming smoother, fringed beneath but not densely with hairs, which also gradually become thinner and shorter. Prothorax wider than long, feebly rounded on the sides, not constricted either before or behind, transversely impressed before the base, which is produced into a broad subtruncate lobe; disk rather flat, with a narrow, smooth dorsal line, and two vague discoidal impressions; scutellum broad, rounded behind; elytra as wide at the base as the thorax, gradually narrower behind, and rounded at tip. Prosternum laminiform between the coxæ, but not prolonged as in Oeme; surface in front of coxæ finely transversely rugose, and depressed each side; the finely roughened dorsal surface extends on the flanks to the prosternal suture, as in Eucrossus, and Oeme, in which the prosternum is similarly sculptured, but not depressed; the coxæ are widely angulated externally, and the whole extent of the coxal fissure is open, though not so widely as in Oeme. The mesosternum is very narrow, and deeply sunk between the coxæ which are very large and prominent, and the cavities are widely open externally; the hind coxæ are prominent. Legs as in the two genera just mentioned, thighs rather stout and compressed, tibial spurs small, hind tibiæ with 1st joint as long as the others united. Ventral segments nearly equal in length, 5th of ♂ nearly equal to the 4th, truncate behind, 6th exposed, emarginate. Body thinly pubescent, above and beneath.

488. G. vittatus. Testaceus, parce pubescens, thorace dense subtilius asperato-punctato, linea tenui dorsali lævi, latitudine breviore, lateribus late rotundatis, apice truncato, basi late lobato; elytris punctatis, costis utrinque duabus parum elevatis, vittisque duabus angustis nigris. Long. 21 mill.

California, Dr. Horn. This genus seems quite distinct from any described in Lacordaire's work, and to present a curious combination of characters. The well-defined angle near the tip of the mandibles is singular, and known in very few other genera of Cerambycini.

OEME Newman.

489. Oe. costata. Nigro-picea, subtiliter parce pubescens, prothorace lateribus late rotundatis, postice modice constricto, disco punctulato, et parce punctato, vitta dorsali lævi; elytris thorace latioribus, elongatis, punctulatis, sutura margine costisque 3 discoidalibus angustis elevatis, interstitiis parce reticulatis. Long. 22 mm.

California, Mr. Ulke. The male has the antennæ as long as the body; the 3—6 joints are armed beneath with acute spines gradually becoming more feeble.

EUCROSSUS Lec.

Body elongate, rather depressed, pale brown, without markings; head as in Oeme, eyes large, coarsely granulated, deeply emarginated; palpi very unequal, labial short, maxillary long, last joint triangular, obliquely truncate; antennæ (♂) longer than the body, 1st joint stout, as long as the head, 2d very short, 3d longer than the 4th, which is equal to the 5th, joints from 3d gradually more slender, 11th not appendiculate, 3d, 4th, and 5th armed with a very small apical spine; beneath densely fringed with long soft hair, becoming gradually thinner, and finally disappearing on the 8th joint. Prothorax wider than the head, transverse, much rounded on the sides, not constricted at base. Elytra scarcely as wide as the thorax, parallel, rounded at tip, with a small subsutural spine. Prosternum narrow, rounded at tip, front coxæ large, prominent, with distinct trochantin; cavities strongly angulated externally, middle and hind coxæ also prominent; mesosternum rather wide, truncate behind, middle coxal cavities open externally. Legs moderate, thighs not clavate, tibial spurs very small, hind tarsi with the 1st joint equal to the others united.

490. Eu. villicornis. Saturate testaceus, thorace (♂) opaco, subtilissime alutaceo et subsericeo, latitudine breviore, lateribus valde rotundatis, linea dorsali lævi, cicatrice vix elevata, sublunata utrinque notato; elytris vage punctatis, pilis erectis haud dense pubescentibus, spina parva subsuturali armatis, dorso utrinque lineis duabus obsoletis. Long. 18—24 mm.

One male, Arizona. Resembles in appearance Oeme, but is less slender; the sculpture of the prothorax is very peculiar, and the dull sericeous surface extends upon the flanks to the prosternum; it is somewhat similar to that seen in Achryson, less the punctures and hairs observed in that genus; the smooth dorsal line is rather broad, and abbreviated near the base; there is on each side a large cicatrix, commencing near the base, extending in front of the middle, then suddenly bent inwards for a short distance, and then turning forwards is suddenly abbreviated. They resemble, in position, the scars on the prothorax of the ♂ of some of our large species of Romaleum, but are much broader.

A female from Owen's valley, California, given me by Dr. Horn, differs from the male by the antennæ shorter, thinner, and less hairy; the 5th ventral segment not truncate, and the 6th not visible. The sides of the prothorax are finely punctured, but the disk is shining, sparsely and coarsely punctured, and somewhat uneven.

There is great variation in the lateral spine of the prothorax; in the smaller ♂ it is quite absent, and the sides are rounded; in a large ♂ from California it is small and acute, in the ♀ it is still more prominent.

HAPLIDUS Lec. (Cerambycini).

Body elongate, slender, rather depressed, antennæ, prothorax, and legs thinly clothed with long flying hairs, of which a few are also seen on the front part of the elytra; front short, vertical; eyes large, emarginate, coarsely granulated; genæ short, very acute; palpi short, equal, last joint cylindrical, truncate. Antennæ slender, scape a little shorter than the 3d joint, 4th about one-fourth shorter than 3d or 5th. Prothorax a little longer than wide, oval, broadly rounded on the sides, feebly constricted at the base, which is truncate; disk densely punctured, with a small median smooth spot in ♀, more finely punctured with a longer dorsal smooth stripe in ♂, and with a feeble dorsal impression and obsolete cicatrix each side of the median line. Elytra elongate, parallel, rounded at tip. Prosternum very narrow and nearly invisible between the coxæ, but not prolonged behind; front coxæ transverse, widely angulated externally; mesosternum broadly truncate behind, coxæ open externally; episterna of metathorax wide in front, and narrowed almost to a point behind, as in Oeme. Legs slender, thighs feebly clavate, hind tarsi as long as the tibiæ, 1st joint longer than two following united. Ventral segments nearly equal in ♀, 1st longer in ♂; 5th shorter in ♂ than ♀, and broadly rounded at tip.

A slender brownish insect, without conspicuous characters, resembling somewhat a very narrow Callidium; the antennæ in the ♂ are as long as the body, in the ♀ about two-thirds as long.

491. H. testaceus. Elongatus, testaceus, subtiliter pubescens, antennis pedibus prothoraceque parce longe villosis; prothorace latitudine paulo longiore, lateribus late rotundatis, postice subconstricto; elytris subrugosis, punctulatis, et parce punctatis. Long. 9—14 mm.

California, Nevada, and Utah; Dr. Horn and Mr. Ulke. The genus is easily known by the short, slender, equal palpi, and by the eyes being less deeply emarginate than in the other genera of the group, and scarcely embracing the base of the antennæ, which are inserted on a line with their front margin.

ACHRYSON Serv.

492. A. concolor. Elongatum, saturate testaceum, pilis pallidis parce vestitum, prothorace opaco latitudine longiore, utrinque augustato, lateribus late rotundatis, confertim haud profunde punctato, subreticulato; elytris nitidis, fortiter haud dense punctatis, punctisque remotis majoribus seriatim digestis, apice haud spinosis. Long. 8·5 mm.

One female; Texas. Of the same form as *A. surinamum*, but smaller; uniform brownish-testaceous, thinly clothed with long pale hairs; the head and thorax are coarsely punctured, the punctures of the latter are not deep, but so close as to produce a reticulate appearance, and in the centre of each puncture is a small puncture from which proceeds a long white hair. The elytra are somewhat paler, polished, deeply but sparsely punctured, with several rows of very distant larger punctures, from which proceed rather longer flying hairs.

AXESTINUS Lec.

Eyes large, coarsely granulated, lower lobe extending in front of the antennæ, which are shorter than the body, compressed serrate, finely sericeous, 12-jointed, with the 4th joint scarcely shorter than the 3d or 5th, and the 12th elongate oval, half as large as the 11th. The genæ are very short, the front quadrate, oblique, concave between the antennal tubercles, otherwise flat and divided by a fine transverse suture; palpi moderate, subequal, last joint thicker, truncate. Prothorax rounded on the sides, longer than wide, somewhat narrowed in front, with two discoidal impressions in front of the middle; sparsely coarsely punctured, with feeble transverse rugæ. Front coxal cavities rounded, the fissure being completely closed. Middle coxal cavities nearly closed externally. Episterna of metathorax narrow, nearly parallel, with a small scent pore near the hind coxæ. Prosternum narrow, mesosternum flat, truncate and subemarginate behind, ventral segments nearly equal, 5th broadly emarginate (♂ ?) at tip. Legs slender, thighs not clavate nor spinose, tibiæ slender, hind tarsi with 1st joint scarcely as long as the two following.

493. A. obscurus. Piceus, subtiliter cinereo-pubescens, prothorace latitudine longiore, antice angustato, dorso antice utrinque impresso, parce vage punctato, et transversim ruguloso, lateribus sub-angulatim rotundatis; elytris thorace latioribus postice paulo angustatis, apice bispinosis, dense punctulatis, punctis majoribus versus basin intermixtis. Long. 30 mm.

One specimen, from Pope's Expedition, probably from the Rio Grande valley. This genus seems related most nearly to Xestia, but differs from it by the punctulate and finely pubescent surface.

OSMIDUS Lec.

Head rather large, eyes large, coarsely granulated, deeply emarginate; front short, nearly perpendicular, without deep frontal suture, vertex between the antennæ not concave; mandibles small, acute, curved; palpi unequal, last joint triangular obliquely truncate. Antennæ longer than the body (♂), slender, densely finely pubescent, not sericeous, 3d and following joints scarcely differing in length, 11th equal to 10th, not divided. Prothorax oval, longer than wide, uniformly convex and densely pubescent, with two basal and two discoidal impressions, very faintly marked; truncate at base and tip, not constricted. Scutellum triangular, rounded behind, elytra scarcely wider than prothorax, elongate, parallel, rounded at tip with a small apical spine, near but not on the suture. Front coxal cavities angulated externally, although the fissure is open only for a short distance; prosternum moderate in width, rounded behind; mesosternum parallel, moderate in width, and subemarginate behind, coxal cavities open externally, epimera not intervening between the sternal plates. Episterna of metathorax narrow, with scent pores distinct. Ventral segments gradually decreasing in length, 6th in ♂ slightly protruding, and more hairy. Legs rather long, thighs stout, but not clubbed, tibial spurs small, 1st joint of hind tarsi as long as the two following.

The body is densely covered with short uniform cinereous pubescence, with small scattered denuded round spots on the elytra, as in some species of Hesperophanes, to which it is allied, but differs by the more elongate form, and the absence of the deep transverse frontal suture.

494. O. guttatus. Elongatus, piceus, dense breviter cinereo-pubescens, prothorace confertim punctato, latitudine longiore lateribus rotundatis, apice basique truncato, disco antice vage biimpresso, et utrinque ad basin leviter impresso; elytris elongatis, parallelis, punctatis, guttis pluribus parvis rotundatis denudatis, apice rotundatis et breviter acuminatis. Long. 17—19 mm.

Two males; Cape San Lucas, Mr. Xantus.

EBURIA Serv.

A polymorphic genus, with which should probably be recombined some of the genera that have been separated from it. Those tabulated below, however differing in other characters, have the front coxal cavities more or less angulated externally, sometimes nearly rounded, and the joints of the antennæ not sulcate. In the ♂ of the first two species the basal joint of the antennæ is somewhat flattened in front, but not sufficiently so to warrant their reception in the group Coeleburia.

A. Middle and hind femora produced at tip into two acute spines; elytra bispinose at tip;

a. Front coxæ not angulated, fissure completely closed; prothorax abruptly constricted before and behind, tuberculate and strongly armed on the sides; color piceous;

Body glabrous above, slightly pubescent beneath, prothorax feebly grossly punctured; elytra with very small ivory spots of which the medial pair and the outer basal one are frequently wanting. 1. ULKEI.

Body densely and finely pubescent, prothorax with a few very large punctures; elytral spots small, distant, outer basal one sometimes wanting, elytral spines equal. 2. PERFORATA, n. sp.

b. Front coxæ angulated; prothorax densely and coarsely punctured, sides subtuberculate in front; lateral spine small, acute, dorsal callosities denuded, color testaceous;

Lateral tubercle of prothorax very distinct; elytra with outer spine shorter, and ivory spots smaller. 3. HALDEMANI.

Lateral tubercle of prothorax feeble; elytra with outer spine longer, and ivory spots larger. 4. QUADRIGEMINATA.

c. Front coxæ angulated; prothorax densely and finely punctured, transversely impressed before and behind the middle, lateral spine acute; color testaceous;

Ivory spots very unequal, thoracic spine strong. 5. STIGMA.

Ivory spots equal, large, thoracic spine very small, (femoral spines very long). 6. DISTINCTA.

B. Femora with short apical spines; elytra obliquely truncate inwards at tip; prothorax coarsely and densely punctured, rounded on the sides, with two denuded dorsal callosities; color testaceous; front coxæ distinctly angulated. PANTOMALLUS *Lac.*

Ivory spots of elytra unequal. 7. OVICOLLIS, n. sp.

C. Femora without spines, apical angles obtuse; elytra transversely subtruncate; prothorax with four dorsal callosities before the middle, lateral spine very small, (front coxæ not angulated);

Abdomen densely, but equably and less finely punctured; sides of prothorax much rounded in front of the spine. 8. TUMIDA, n. sp.

Abdomen unequally punctured; sides of prothorax very feebly rounded in front;

Ivory spots geminate, apex of elytra truncate. 9. MUTICA.

Ivory spots single, apex of elytra nearly rounded, with a small sutural spine. 10. MANCA.

1. *E. Ulkei* Bland, Proc. Am. Ent. Soc. Phila., i. 270; Lower California, Cape San Lucas, Mr. Xantus. The antennal tubercles are very acute and elevated, the 1st joint of the antennæ is in the ♂ stouter, flattened or feebly sulcate in front, and the 11th joint is longer than the 10th.

495. E. perforata. Robusta, picea, dense sordide cinereo-pubescens, prothorace latitudine breviore, apice basique constricto, lateribus ante medium tuberculatis, ad medium spina valida armatis, dorso punctis grossis parcis notato; elytris punctulatis et haud profunde punctatis, apice bispinosis, callis eburneis parvis valde discretis, exteriore basali sæpe deficiente. Long. 23—30 mm.

Texas and Northern Mexico. I should consider this as *E. stigmatica* Chevr. Col. Mex. Cent. 1., but the description states that the sutural spine of the elytra is wanting, the tip being truncate. The basal joint of the antennæ in the ♂ is a little flattened in front, and the 11th joint is a little longer than the 10th.

2. E. *Haldemani* Lec., Journ. Acad. Nat. Sci., Phila., 2d, ii, 102, I have a specimen from Missouri which is almost intermediate between the Texan specimens, and the ordinary 4-*geminata* of the Southern States, and the Mississippi valley. The elytral spots are smaller than the specimens from Georgia, as is usually the case with the Missouri specimens, but the subapical protuberance on the sides of the prothorax is as strong as in any Texan specimen of *E. Haldemani*. In all of the latter species that I have seen, the sutural spine is well marked, while the outer one is short, and not prominent; the specimen in question has them equal as in *E. 4-geminata*. The evidence is in favor of combining the two forms as one species, but for the present it is safer to retain them as distinct.

496. E. ovicollis. Elongata, fusco-testacea, piceo-nebulosa, subtiliter dense pubescens, prothorace latitudine longiore, lateribus late rotundatis, confertim punctato, callis discoidalibus duobus denudatis, apice et basi truncato haud constricto; elytris apice intus oblique truncatis, vix aut breviter spinosis, fortiter sat dense punctatis, callis eburneis geminatis approximatis, basalibus parvis, mediis elongatis, internis autem multo brevioribus. Long. 18—23 mm.

Texas and Northern Mexico. The 11th joint of the antennæ of ♂ is longer than the 10th; the hind femora extend a little beyond the tip of the elytra, and are not spinose at tip. The front coxæ are very distinctly angulated externally, though hardly more so than in the four preceding species in the synoptic table, and the coxal fissure is open for a small portion of its extent.

In one specimen the inner basal ivory spot is almost wanting; in another the outer one is so reduced as to be hardly larger than the inner one.

497. E. tumida. Fusco-picea, dense minus subtiliter griseo-pubescens, prothorace latitudine breviore, antice transversim marginato, lateribus pone apicem subito rotundatis, spina laterali minuta, parce fortiter punctato, callis 4 denudatis ante medium transversim sitis, intermediis elatioribus; elytris haud dense punctatis, apice paulo truncatis, spina externa obsoleta, suturali distincta, callis eburneis parvis discretis. Long. 15—20 mm.

Texas; the body beneath is densely punctured, clothed with rather coarse pubescence. The ivory spots of the elytra are small, in one specimen the outer one of the hind pair is longer than the inner one, and the spots of the basal pair are nearly equal; in a second specimen the outer basal spots are nearly obliterated, and the hind pair are reduced to merely elevated points. The front coxæ not at all angulated externally.

ELAPHIDION Serv.

Sub-Genus ROMALEUM White.

The species of this sub-genus differ from genuine Elaphidion by the more robust form, and by the episterna of the metathorax being distinctly wider in front, and gradually narrowed behind, though much less so in the 2d division than in the 1st. The prothorax is comparatively wider, and has a slight tendency to a tubercle on the sides; the pronotum is coarsely punctured with a medial and two dorsal callosities in ♀, very densely punctulate, with a posterior medial channel and dorsal cicatrices in the ♂. The antennæ are longer than the body in ♂, shorter in ♀, the spines are never long, the sensitive spaces are distinct, commencing on the 4th joint in a small elongate depression, extending on the following joints so as to occupy gradually the whole length; a very small fovea may be usually seen near the end of the 3d joint. The prosternum is always rounded behind, and the mesosternum gently declivous. The femora are not spinose. The last joint of the palpi is less dilated than in genuine Elaphidion.

The species form two natural groups:—

A. Body uniformly finely pubescent;
  Both angles of 3d and 4th joint of antennæ spinose. 1. PROCERUM.
  Outer angle of 3d and 4th joint spinose. 2. SIMPLICICOLLE.
B. Body irregularly pubescent, with spots of coarser and denser hair.
  Pubescence mottled, irregular. 3. ATOMARIUM.
  Pubescence uniform, fulvous. 4. RUFULUM.

Sparsely pubescent, elytra very coarsely punctured before the middle, with an irregular transverse patch of white pubescence at the middle.
5. TÆNIATUM.

Sub-Genus ELAPHIDION.

The metathoracic episterna are scarcely wider in front than behind, and there are no distinct sensitive spaces on the antennæ; the antennæ are longer than the body in the ♂ and shorter in the ♀. The prothorax of the ♂ in some species is more finely punctured than in the ♀, but the difference is never as obvious as in the preceding sub-genus; the prothorax is sometimes rounded on the sides, sometimes straight, and usually marked with dorsal callosities. The prosternum is sometimes perpendicular behind, in which case the mesosternum is suddenly declivous in front, and the femora spinose at tip; otherwise it is rounded, the mesosternum obliquely declivous, and the thighs unarmed; in the second case the elytra are sometimes merely truncate or even rounded at tip, and the antennal spines occasionally obsolete. The scent pores are usually not very distinct, sometimes (*E. subpubescens*) remarkably large, sometimes (*E. moestum*) apparently wanting. The legs are usually finely punctured and pubescent, without distinct flying hairs, sometimes coarsely punctured and sparsely hairy, the hairs being in a few species very long (*E. pusillum*). The body is more or less densely pubescent, except in *E. unicolor*, which is polished as in Ibidion and Sphærion.

A. Antennæ and elytra with very long spines; thighs spinose at tip; prothorax perpendicular behind, mesosternum gibbous; prothorax ♂ ♀ similar, with several callosities;
Above glabrous, with patches of white hair. 6. IRRORATUM.
Above clothed irregularly with gray pubescence. 7. MUCRONATUM.
B. Antennal spines small; prosternum rounded behind, mesosternum obliquely declivous; thighs not spinose at tip; prothorax ♂ finely, ♀ more coarsely punctured; (scent pores indistinct in a, b, or very obvious, c, or wanting d);
a. Prothorax rounded on the sides with several dorsal callosities, elytra truncate and strongly bispinose at tip;
Pubescence grayish-brown, mottled. 8. INCERTUM.
b. Prothorax feebly rounded on the sides, elytra not bispinose at tip, pubescence grayish-brown, mottled, (legs densely punctured and pubescent);
Thorax with a medial smooth space, and no discoidal callosities, tip of elytra truncate inwards, not spinose. 9. INERME.

Thorax with a medial smooth space and two small discoidal callosities, tip of elytra subtruncate, sutural spine distinct. 10. TRUNCATUM.

Thorax more rounded on the sides, dorsal space coarsely punctured, tip of elytra rounded, suture not spinose. 11. SPURCUM.

c. Prothorax scarcely rounded on the sides, nearly cylindrical (except in *pumilum*), elytra bispinose at tip;

α. Pubescence mottled, flying hairs not very obvious; elytral spines long; legs densely punctured and pubescent;

Prothorax scarcely longer than wide. 12. VILLOSUM.

Prothorax distinctly longer than wide. 13. PARALLELUM.

β. Pubescence mottled, flying hairs very long and numerous on legs and antennæ, legs very sparsely punctured;

Elytral spines very short. 14. PUMILUM.

γ. Pubescence sparse, coarse, uniform, body very long and slender, coarsely punctured, legs coarsely punctured;

Flying hairs sparse, antennal and elytral spines moderately long. 15. SUBPUBESCENS.

Flying hairs long; antennal and elytral spines long. 16. ACULEATUM, n. sp.

δ. Body shining, testaceous, sparsely punctured, nearly glabrous;

Flying hairs sparse; elytral spines long. 17. UNICOLOR.

d. Prothorax rounded on the sides, coarsely punctured (♂ ♀) without callosities, body more robust, uniformly coarsely and sparsely pubescent, elytra rounded at tip; legs coarsely punctured; scent pores not visible. 18. MOESTUM.

C. Antennal spines completely wanting; pubescence uniform sparse; form slender, prothorax feebly rounded on the sides;

a. Pubescence intermixed with long flying hairs, elytra rounded at tip, legs very finely pubescent, scarcely punctured. 19. PUNCTATUM, n. sp.

b. Pubescence without long flying hairs; elytra truncate at tip, legs very coarsely punctured; punctuation of prothorax ♂ ♀ dissimilar, (ANOPLIUM *Hald.*, emend. *Lac.*) 20. CINERASCENS.

E. (R.) operarium *White*, B. M. Cat., Long. 309, 1855, is either *procerum* or *simplicicolle;* the locality is given as doubtfully Indian, and the characters are not sufficient to determine to which of the two species it should be referred.

4. *E.* (*R.*) *rufulum* Hald., seems sufficiently distinct by the much finer and less mottled pubescence, though very closely allied to *atomarium*. The correct synonymy of the latter is as follows: *Cer. atomarius* Drury, = C. pulverulentus *De Geer*, = Stenocorus marylandicus *Fabr.*, = Callidium maryl. *Olivier.* The second name was erroneously applied by Haldeman to the species, a variety of which was afterwards described by him as

Enaphalodes simplicollis, without generic definition. It is useful to mention, as showing the instability of the characters relied on as of value in the classification of Cerambycidæ, that there is before me a specimen of *E. rufulum* in which the left front coxal cavity is open as much as in any Hesperophanes.

Thersalus bispinus Pascoe, Journ. Ent. ii, 372 (1855), is closely allied to if not identical with *E.* (*R.*) *atomarium*, and the fact that it was previously described (Trans. Ent. Soc. Lond., 3d, i, 562) as Phacodes, indicates tolerably clearly that the genus Phacodes should be partly suppressed, as being merely a slight Australian geographical variation upon Elaphidion.

7. *E. mucronatum* (Fabr.), Hald., = *muricatum* Hald.

8. *E. incertum* Newn., = aspersum *Hald.*, = vicinum *Hald.* = neglectum *Lec.*

9. *E. truncatum* Hald., which has been cited as synonymous with *E. inerme* Newman, is quite distinct by the characters given above. The type, now in my possession, is probably Mexican, but the species has since occurred in Texas and is = E. debile *Lec.*

12. *E. villosum* (Fabr.) = Stenocorus putator *Peck.*; ♂ with 5th ventral rounded at tip.

13. *E. parallelum* Newman, = arctum *Newm.*, = oblitum *Lec.*; ♂ with 5th ventral truncate at tip.

15. *E. subpubescens* Lec., New Jersey and Texas. The palpi in this species are very unequal, but this character hardly indicates a distinct genus.

498. E. aculeatum. Valde elongatum, piceo-testaceum, parce longius pubescens, et pilis volatilibus villosum, prothorace latitudine sesqui longiore, medio paulo latiore, confertim grosse punctato, callo dorsali inconspicuo lævi; elytris minus dense punctatis, nitidis, apice fortiter bispinosis, spina exteriore elongata; antennarum articulis 3io et 4to spinis longis, 5to autem brevi armatis. Long. 15 mm.

One ♂, Texas, Dr. Horn. Nearly allied to *E. subpubescens* Lec., but easily known by the prothorax being less cylindrical, the outer spine of the elytra and the antennal spines much longer, by the flying hairs much longer, and the body beneath coarsely not densely punctured. The hind angles of the metasternum are densely pubescent, the scent pores moderately distinct, and the legs coarsely punctured. The ventral segments diminish rapidly in length, and the 5th joint is broadly truncate.

17. E. unicolor; *Stenocorus un.* Randall, *Stizocera un.* Hald, *Psyrassa un.* Pascoe. I can find no sufficient characters for separating this as a distinct genus, much less placing it in another tribe.

499. E. punctatum. Elongatum piceum, fortiter punctatum, pilis longiusculis griseis parce vestitum, prothorace latitudine longiore, linea dorsali lævi calloque elongato indistincto utrinque notato; elytris parallelis, apice rotundatis haud spinosis, scutello luteo-pubescente; palpis antennis pedibusque ferrugineis, pube subtili pallida vestitis, his vix punctulatis, pilis volatilibus elongatis sat numerosis, antennis haud spinosis; metasterno poris odoriferis nullis. Long. 10—12 mm.

Two females, Cape San Lucas, Lower California; Mr. Xantus. The body beneath is finely punctulate and pubescent, with longer hairs intermixed. The general form is as slender as in *E. parallelum.*

19. *E. cinerascens* Lec., Anoplium unicolor ‖ *Hald.*; ♂ with 5th ventral emarginate, leaving the 6th visible. Placed by Lacordaire in his group Callidiopsides, but I can see no reason for separating it so widely from Elaphidion, to which it is evidently most closely related.

ANEFLUS Lec.

This genus is rendered necessary for certain species which completely resemble the elongate forms of Elaphidion, (*subpubescens,* etc.), in appearance, sculpture, and pubescence, but differ by having the joints of the antennæ from the 5th flattened, and distinctly carinate along the middle of the flat sides. The legs are coarsely punctured and pubescent, the tibiæ are finely carinate, but not more distinctly than in many species of Elaphidion, and except in *E. tenue,* the carinæ are not visible on the hind pair; the spurs are well developed. The 1st ventral is evidently longer than the others, and the 5th in ♂ is broadly emarginate.

The species may be tabulated as follows:—

A. Prothorax distinctly dilated and feebly angulated on the sides; elytra bispinose at tip; hind tibiæ scarcely carinate; palpi unequal, with the last joint dilated triangular;

Very large, spines of antennæ moderately long. 1. PROTENSUS.

B. Prothorax cylindrical, sides nearly straight;
  a. 3d joint of antennæ with spine a little longer than that of the following joint; palpi with last joint not dilated;
Elytra emarginate at tip, slightly bispinose, flying hairs of tibiæ long, not very numerous. 2. LINEARIS.
  b. 3d joint of antennæ with the spine much longer;
Elytra emarginate at tip, flying hairs of tibiæ not conspicuous, palpi with last joint not dilated. 3. TENUIS.
Elytra truncate at tip, suture more prominent, flying hairs of tibiæ long, numerous; palpi very unequal, with last joint triangular, dilated; (antennal carinæ obsolete). 4. VOLITANS, n. sp.

1. *A. protensus*, Elaphidion prot. *Lec.*, Proc. Acad. Nat. Sci., 1858, 82. Arizona.

2. *A. linearis*, Elaphidion lin. *Lec.*, ibid. 1859, 80. California.

3. *A. tenuis*, Elaphidion tenue *Lec.*, ibid. vii, 81. Texas and Arizona. In this species, as in the preceding, the palpi are not dilated and not very unequal; the hind tibiæ are, however, much more distinctly carinated; the spine of the 3d antennal joint is two-thirds as long as the 4th joint, and the spine of the latter is quite small.

500. A. volitans. Fuscus, parce longo pallide pubescens, prothorace latitudine longiore confertim punctato, lateribus late rotundatis; elytris fortiter punctatis, apice truncatis, sutura prominula; tibiis pilis volatilibus longis, conspicuis. Long. 10 mm.

One female, Cape San Lucas, Mr. Xantus. In this species as in *A. protensus*, the first joint of the antennæ is longer and less thickened than in *linearis*, and slightly curved; the outer joints are scarcely carinate, the spine of the 3d joint is two-thirds as long as the 4th joint, and the spine of the latter is also long, being fully one-third as long as the 5th joint. The palpi are very unequal, and the last joint is triangular and much dilated. The hind tibiæ are only feebly, and hardly perceptibly carinate.

EUSTROMA Lec.

This new genus is founded upon *Elaphidion validum* Lec., Pro. Acad. Nat. Sci., Phila. 1858, 82, which occurs in Texas, Arizona, and Lower California. It is allied to Elaphidion, but differs in having the antennæ shorter and stouter, with the outer joints compressed, sericeous pubescent; the lower joints are shining, sparsely punctured, and thinly clothed with long fulvous hairs, the 3d and 4th are flattened, and slightly concave beneath; the 1st joint is as long as the 3d and stouter, the 3d is equal to the 5th in length, but is thicker and armed with a short spine at the outer angles, the 4th is about two-thirds as long as the 3d, and armed with a smaller spine; the spines of the 5th and 6th joints are very small; the palpi are unequal, and the last joint is somewhat, though not very strongly, triangular. The mandibles are stout, acute, and the outer margin is suddenly bent near the tip in the ♂ so as to appear transversely truncate (as in *Axestinus*), but is regularly curved, and normal in form in the ♀. The front coxal cavities are rounded, not at all angulated externally, and only narrowly open behind; the prosternum is rounded behind; the mesosternum nearly perpendicular in front, horizontal, and emarginate behind; coxal cavities closed externally, and scarcely angulated. Ventral segments slightly decreasing in length, 5th rounded at tip in both sexes. Legs short, stout, densely and coarsely punctured, tibiæ strongly carinate, and broadly grooved, spurs moderate, tarsi broad, 1st joint of hind pair but little longer than the 2d.

The body above and beneath is punctured, and clothed with rather coarse, yellowish-brown hair; the prothorax has several smooth confluent spaces, the intervals being very coarsely punctured; the ♂ has in addition a large lateral densely pubescent spot; the scutellum is broad and rounded behind, the elytra are feebly truncate at tip, and armed with a small sutural spine. The form is robust, about like *Elaphidion atomarium.*

This species by the hairy spaces of the prothorax shows some resemblance to *Stromatium*, from which it is quite distinct by the front coxal cavities not angulated externally as well as by many other characters above detailed.

ZAMODES Lec.

Head moderate, front short, nearly perpendicular, frontal suture oblique each side, deep; eyes coarsely granulated, deeply emarginate, upper part less narrow than usual; mandibles small, curved acute; palpi not very unequal, last joint triangular obliquely truncate. Antennæ (♂) a little longer than the body, punctured, finely pubescent, hispid with numerous long, erect flying hairs, thicker at the base, gradually attenuated externally, not sulcate nor carinated, 3d joint a little longer than the 4th, the latter and following ones nearly equal, 11th very feebly appendiculate. Prothorax rounded on the sides, constricted at the basal margin, without dorsal callosities. Elytra parallel, rounded at tip. Front coxal cavities round, not at all angulated externally; open behind, prosternum very narrow between the coxæ; middle coxæ rather widely separated, scarcely angulated externally, mesosternum subtriangular, emarginate behind; metathorax emarginate behind, episterna narrow, scent pores not distinct; ventral segments equal, 1st a little longer, 5th rounded at tip, 6th not visible. Legs stout, thighs compressed, gradually tolerably strongly clavate, tibiæ not carinate, spurs moderate, first joint of hind tarsi as long as the two following.

The body is covered with fine short brown pubescence, with long erect hairs intermixed.

501. Z. obscurus. Supra piceo-niger, opacus, dense subtiliter fusco-pubescens, pilis erectis intermixtis, prothorace latitudine haud longiore, lateribus rotundatis, punctulato et haud profunde grosse punctato; elytris antice fortiter punctatis, punctis postice sensim subtilioribus; subtus piceus, subtiliter punctulatus, pubescens et pilosus, prosterno vage punctato. Long. 13 mm.

One specimen; Pennsylvania. Of the same form and size as *Tylonotus bimaculatus*, but quite distinct by the antennæ not being sulcate, the prothorax without callosities, and the piceous legs. The general appearance is that of a Callidium.

It is quite possible that this genus is not distinct from Zamium *Pascoe*. It agrees in all particulars with the detailed description given by Lacordaire, l. c. viii. 215, but does not possess the group characters of Saphanides, in which Zamium is placed by my learned and lamented friend. The second joint of the antennæ is quite small in the present genus, which would prevent its association with Saphanus, Opsimus, etc.

COMPSA PERTY emend. LAC.

502. C. puncticollis. Elongata, picea, pube brevi cinerea pruinosa, prothorace latitudine duplo longiore, lateribus paulo rotundatis, confertim punctato, opaco; elytris nitidis, punctulatis punctisque majoribus raris intermixtis, scutello dense cinereo-pubescente. Long. 8—13 mm.

Cape San Lucas, Lower California, Mr. Xantus. The 3d and following joints of the antennæ are finely carinate, and the front coxal cavities are entirely closed; in the ♂ the 3d and 4th joints are as stout as the 1st, and the 5th is less enlarged. The 4th joint is shorter than the 3d in both sexes, but is as long as the 5th.

503. C. quadriplagiata. Piceo-castanea, subtilissime cinereo pubescens, prothorace impunctato, latitudine plus duplo longiore, callo angusto ad medium elevato, disco utrinque magis convexo et ante basin bituberculato; elytris parce punctatis, punctisque majoribus raris intermixtis, macula utrinque pallida quadrata ante medium, alteraque pone medium ornatis; antennis flavo-testaceis, basi castaneis. Long. 10 mm.

One ♀; Cape San Lucas, Lower California; the dorsal callus of the prothorax is narrow, short, and carinated; the disk each side is more convex, but scarcely gibbous; near the base on each side is seen an elevated tubercle. The larger punctures of the elytra in this and the preceding support flying hairs, which are not however very long or as conspicuous as in the polished species of Heterachthes.

PLECTROMERUS Lec.

I have adopted this unpublished name of Dejean for *Callidium dentipes* Oliv., (Curius scambus *Newm.*). It is fully described by Lacordaire, l. c. viii. 352, as Curius; the type of the genus *C. dentatus* (concinnatus *Hald.*) not having been seen by him; he has mentioned the differences in a note, and they are chiefly as follows

Body depressed, opaque in Curius, cylindrical and polished in Plectromerus; prothorax rounded on the sides in the first, nearly straight in the second; 4th joint of antennæ a little shorter than the 5th in the first, very much shorter in the second. The thighs are pedunculated, and suddenly clavate in Plectromerus, and the tooth is much larger than in Curius, in which they are more gradually dilated.

CALLIMUS Muls.

504. C. chalybæus. Viridi-cyaneus, nitidus, prothorace latitudine longiore, parce punctato, lateribus late rotundatis, convexo postice paulo angustiore et constricto; elytris parallelis apice rotundatis, parce punctatis et pallide pubescentibus; femoribus anticis, vel ferrugineis, vel cyaneis. Long. 6 mm.

California; Mr. Ulke and Dr. Horn. The punctures of the elytra are tolerably strong near the base, and become finer towards the apex. The prosternum is sparsely punctured, the abdomen nearly smooth. I have seen four specimens, all males, having the ventral segments nearly equal. The eyes are rather finely granulated, and the last joint of the palpi is broadly triangular.

EUMICHTHUS Lec.

Front declivous, with a deep lunate impression each side; eyes not very finely granulated, deeply emarginate; genæ short not prominent; palpi rather short, last joint triangular, not so broad as in Callimus; antennæ slender, a little longer than the body (♂), with a few long flying hairs, 2d joint half as long as 3d, remaining joints nearly equal. Prothorax convex, without tubercles, narrowed feebly in front, more strongly behind; elytra wider than prothorax, cylindrical, rounded at tip. Prosternum very narrow, mesosternum triangular, moderately wide; thighs strongly clubbed, tarsi with the 1st and 2d joints swollen and convex; the 3d is also enlarged in the front and middle pairs but is smaller in the hind pair.

505. Eu. œdipus. Piceo-ferrugineus, subtiliter pubescens, pilis volatilibus parce pilosus, capite thoraceque vix punctulatis, hoc latitudine paulo longiore, lateribus rotundatis, postice angustiore et constricto; elytris punctulatis, fascia pallida subeburnea obliqua ante medium pube dense pallida vestita, alteraque latiore pone medium cinereo-pubescente ornatis, spatio intermedio nigricante. Long. 5 mm.

One ♂; Vancouver Island, Mr. Matthews. A very singular little insect, having from the form of the elytral bands a resemblance to *Callidium decussatum* Lec. The elytra are marked near the base with a few scattered large punctures, from which proceed long black flying hairs; the front band is covered with dense whitish hair, but looks as if it were slightly elevated; it is feebly sinuate, directed backwards towards the suture.

PHYTON Newm.

506. P. discoideum. Rufo-testaceum nitidum, oculis magnis fortiter granulatis, prothorace antice posticeque constricto, basi valde angustato, lateribus obtuse fortiter dilatatis, dorso subinæquali parce punctato; elytris parce punctatis, nebula magna fusca maculam rotundatam pallidam communem includente; antennis ♂ corpore paulo longioribus. Long. 6 mm.

Two ♂, Cape San Lucas, Mr. Xantus. Varies with the elytral markings obsolete. Of the same form as *P. pallidum* (Say) (Diozodes pall. *Hald.*, P. limum *Newm.*), but quite different by the markings.

HYBODERA Lec.

Front declivous, canaliculate, divided anteriorly by a deep transverse line; eyes finely granulated, deeply emarginate; genæ short rectangular; palpi equal, slender, last joint slightly oval. Antennæ slender, scape as long as 3d joint, 3–5 gradually increasing in length. Prothorax strongly constricted in front, less behind, base as wide as the apex, sides obtusely angulated, disk with four tubercles arranged in a square. Elytra wider than prothorax, flat parallel, rounded at tip. Front coxæ separated by prosternum, widely angulated externally, inclosed behind; middle coxæ widely separated by truncate mesosternum, narrowly open externally; epimera of metathorax wider in front, gradually narrowed behind. Thighs very strongly clubbed; 1st joint of hind tarsi equal to 2d and 3d united.

In the ♀ the 1st ventral segment is very long; the 2d deeply excavated, and nearly perpendicularly declivous behind, the following joints short and retracted.

A few flying hairs are seen on the antennæ and legs.

507. H. tuberculata. Nigro-picea, pube appressa brevi cinerea vestita, prothorace elytrisque fusco-variegatis. Long. 9 mm.

Oregon and Vancouver Island. The mottlings of the elytra are not very definite, but the cinereous portions are more concentrated at the base, and in a broad band behind the middle.

PILEMA Lec.

This genus resembles so closely the European Cartallum, that no detailed description is necessary. It agrees precisely in form, appearance, and general characters, but differs by the palpi being slender, with the last joint cylindrical (not triangular), and by the mesosternum being wide and truncate (not narrow and subacute behind). The hind tibiæ are somewhat curved.

508. P. ruficolle. Nigrum opacum, prothorace rufo nitido parce punctato, disco fortiter trituberculato, medio subtiliter carinato, antice constricto, lateribus obtuse tuberculatis, basi subconstricto profunde transversim impresso, margine basali nigro; elytris planis, punctatis, angulo suturali prominulo. Long. 8—9 mm.

Napa, and Mariposa; California. The 1st ventral segment in ♀ is as long as the others united, the 2d excavated, clothed with very long fulvous hair. The antennæ and legs are clothed with very long flying hairs; on the prothorax and elytra only a few remain, having been lost probably in the alcohol in which the specimens were preserved.

509. P. cyanipenne. Flavo-ferrugineum, longe villosum, (prothorace ♀ rufo, ♂ nigro) capite, antennis, pospectore, femoribus apice, tibiis tarsisque nigris; elytris cyaneis, planis, punctatis. Long. 7—8 mm.

California, Dr. Horn and Mr. Edwards. Of the same size as the preceding, but the prothorax is less angulated on the sides, not deeply transversely impressed at the base, and there is no impressed dorsal line.

Two ♂ have the prothorax black, the base of the tibiæ yellow, and the elytra greenish-blue.

MEGOBRIUM Lec.

This new genus is founded on a comparatively large species from California, which is intermediate between Cartallum and Pilema, having the palpi with the last joint slightly dilated and oval, truncate at tip, and the mesosternum narrow, but scarcely acute as in Cartallum. It differs from both by the prothorax being longer, with the lateral tubercles much larger and obtuse, and the apical and basal constrictions longer, equal in width. As is commonly the case, in intermediate grades of structure, the specific characters are quite different, so that a stronger individuality is thereby impressed on the organism. The color is testaceous; the punctures of the elytra but few, not coarse, and arranged in three lines extending from the base to a little behind the middle; there are a few scattered punctures between these lines, and outside of them; there is an appearance of an angulated pale band, with the point directed forwards on the suture, in front of the middle, and a few nebulosities behind. The antennæ are longer than in Pilema, and the outer joints are comparatively more equal. The sexual characters are as in the two allied genera.

510. M. Edwardsii. Fusco-testaceum, opacum parce pubescens, antennis pedibus prothoraceque pilis volatilibus parcius villoso, hoc latitudine longiore, tuberculo laterali majore obtuso, antice posticeque late constricto et lateribus sinuato; elytris alutaceo-granulatis, versus suturam parce punctato-striatis, punctis pone medium obsoletis, litura angulata pallidiore mox ante medium signatis. Long. 12 mm.

One ♀; Santa Rosa Island, California, Mr. H. Edwards, to whom I take pleasure in dedicating this remarkable addition to our fauna.

MOLORCHUS Fabr.

511. M. longicollis. Niger, antennis pedibus prothoraceque pilis volatilibus munitis, hoc latitudine sesqui longiore, apice basique constricto, pone medium paulo latiore, et lateribus angulato, dorso planiusculo minus dense punctato; elytris punctatis, testaceis, planis, oblique impressis et ad apicem paulo tumidis; pedibus antennarumque basi piceo-ferrugineis. Long. 8 mm.

One ♂, California, Mr. Ulke. Differs from *M. bimaculatus* chiefly by the prothorax being narrower, less rounded, somewhat angulated at the sides, and less densely punctured. The antennæ are longer than the body, slender, piceous, with the first joint brownish-red.

RHOPALOPHORUS Serv.

512. R. lævicollis. Niger, opacus, prothorace impunctato, cinereo pubescente, vitta dorsali glabro, apice basi subtusque plus minusve rubro; elytris fortiter punctatis, cinereo-pubescentibus; antennarum articulo 4to sequentis dimidium æquante. Long. 12 mm.

Texas and northern Mexico. Larger than the other species in our fauna, and easily known by the impunctured prothorax, which is distinctly constricted on the sides at the base, though the constriction does not extend upon the disk.

HOLOPLEURA Lec.

Body elongate, rather depressed, densely punctured, pruinose with extremely short white hairs, head short, front small, vertical, mouth small; palpi short, stout, genæ moderately long; eyes rather small, somewhat finely granulated, very deeply emarginate, upper lobe very narrow; antennæ widely separated, placed on very feebly elevated tubercles, 11-jointed, sparsely fringed with long hairs, scape stouter, cylindrical, as long as 3d joint, 2d joint small, 4th about one-third shorter than the 3d, 5th and following about equal to the 3d, gradually thinner, 11th not at all divided.

Prothorax rounded, punctuation of sides finer and denser than on the disk, base and apex nearly truncate; scutellum transverse; elytra parallel, rounded at tip, humeri nearly rectangular rounded, sides perpendicularly deflexed, lateral margin distinct, epipleuræ narrow, well defined, extending to the sutural tip.

Prosternum not wide between the coxæ, which are small, not prominent, cavities angulated, closed behind; middle coxal cavities widely open externally, mesosternum wide, truncate behind; episterna of metathorax pointed behind, epimera prolonged to meet the ventral segments, of which the 1st is longer, and the others equal, the 5th subtruncate (♂). Legs slender, thighs pedunculate and clubbed, tibial spurs small; tarsi broad, 1st joint of hind pair one-half longer than the 2d.

This tribe has affinities with the Callidiini, but differs not only by the shorter 2d joint of antennæ, but by the front coxæ being inclosed behind, and from all other tribes by the epipleuræ extending in equal width, and horizontally inflexed from base to tip.

513. H. marginata. Nigra opaca, dense punctata, brevissime albo-pubescens, prothorace rotundato latitudine paulo breviore, margine basali apicalique, vittisque indistinctis tribus rubris; elytris margine basali lateralique usque ad suturam rubro, macula elongata laterali pone humeros nigra. Long. 9 mm.

One male, Marin County, California, Mr. Edwards. The lateral spot is in the red margin, and reaches from the base for one-fifth the length of the elytra, extending also upon the epipleuræ.

514. H. Helena. Læte coccinnea opaca, subtiliter pubescens, prothorace confertim haud profunde punctato, guttis duabus nigris ornato; elytris obsolete sed grosse punctatis, guttis utrinque tribus nigris ornatis, 1ma submarginali pone basin, 2nda subsuturali ante medium, 3ia discoidali pone medium; ore antennis, pedibus, trunco, abdomineque nigris. Long. 8 mm.

Mariposa, California; for this lovely little species I am indebted to Mr. Thevenet, of Paris; it was collected by his brother, Dr. Thevenet, now living in California. The scarlet color is singularly bright; the sculpture of the elytra is curious, being composed of large closely placed punctures, so shallow as to appear obliterated.

CALLICHROMA Latr. (emend. Serv.).

515. C. cobaltinum. Læte cyaneum, prothorace transversim minus rude rugoso, antennis pedibusque nigris, femoribus posticis abdomineque ferrugineis. Long. 25—36 mm.

Cape San Lucas, Lower California. Related to the Texan *C. plicatum* Lec., but the transverse rugæ of the prothorax are not so coarse, the anterior transverse constriction more regular and stronger, the color of a beautiful blue (not green), and finally the front and middle thighs are black.

SCHIZAX Lec.

Body elongate, clothed with short coarse pubescence, flying hairs sparse at the base of the antennæ and legs; head rather small, front short, deeply impressed transversely; mandibles obtuse and subemarginate at tip, though the outline is concealed by the pubescence; genæ short, rounded; eyes large, finely granulated, broadly divided, lobes nearly equal in size, rounded triangular; palpi stout, short, last joint truncate, impressed; antennæ (♂) twice as long as the body, ♀ about one-third longer than the body, slender, punctured, and pubescent, with a few flying hairs near the base, 11th joint longer, slightly curved at the tip in both sexes. Prothorax narrowed in front and behind, with an acute lateral spine one-third from the base. Scutellum moderate in size, elongate, triangular, acute; elytra parallel, broadly rounded at tip. Prosternum broad between the coxæ, which are not angulated externally; mesosternum broad, protuberant, truncate behind, coxal cavities open externally; metasternum with side pieces rather broad, scent pores distinct. Ventral segments slightly diminishing in length. Legs slender, hind pair longer; hind thighs ♂ extending to the tip of the elytra; hind tarsi with the 1st joint, as broad as, and equal to, the two following united.

Remarkable in the group of Tyloses for the divided eyes, which have suggested the generic name.

516. S. senex. Niger opacus, pube brevi minus subtili cinerea vestitus, prothorace fortius, elytris subtilius punctatis, his margine suturali laterali apicali et scutello fulvo-pubescentibus. Long. 13—17 mm.

Arizona, collected by Drs. Horn and Palmer; the rapidity of flight of this insect is wonderful. The pubescence of the elytra is less dense than that of the under surface, and not evenly distributed, so as to give a mottled appearance. The outer condyle of the thighs is elongated into a short obtuse process.

CROSSIDIUS Lec.

The species of this genus vary greatly in color, and are somewhat difficult to recognize by the scattered descriptions heretofore published. I have constructed the following table to enable them to be more easily identified:—

A. Prothorax subquadrate;

Black clothed with long gray hair; elytra very densely punctured, punctures very coarse at the base, becoming finer behind; front tibiæ with a dense brush of hair on the inner side. Utah; Eastern California. 1. ATER *Lec.*

B. Prothorax rounded and subtuberculate on the sides;

a. Elytra very coarsely punctured towards the base, punctures becoming smaller behind;

Head, antennæ, and legs black; under surface and pronotum black or rufous; elytra rufo-testaceous with basal margins and sutural blotch black, the latter usually narrow or wanting in ♂, broad in ♀. 2. PUNCTATUS n. sp.

Testaceous, antennæ fuscous, legs ferruginous; elytra with two costæ more distinct than in the other species. Colorado Desert. 3. TESTACEUS *Lec.*

Testaceous, antennæ fuscous, legs ferruginous; elytra without costæ, suture black, broader in ♀. Arizona. 4. INTERMEDIUS *Ulke.*

Smaller; antennæ, legs, and head black; under surface yellow, trunk frequently, abdomen rarely blackish; pronotum more or less black; elytra yellow with humeral spot and sutural blotch more or less dilated, black. Colorado and New Mexico. 5. PULCHELLUS *Lec.*

b. Elytra less coarsely punctured, punctures smaller towards the tip;

Black, abdomen usually ferruginous; elytra rufo-testaceous, with basal margin, and usually the whole of the suture black, the blotch never very much dilated; front tibiæ with a dense brush of hair on the inner side. Oregon. 6. HIRTIPES *Lec.*

C. Prothorax rounded on the sides, not angulated;

Dull testaceous, densely pubescent; punctures of elytra dense, finer behind, a short humeral vitta black, which in one specimen has a continuation near the tip (indicating that it may be entire in some individuals). New Mexico. 7. HUMERALIS *Lec.*

Bright red, antennæ, legs, postpectus, and head black; elytra coarsely punctured, punctures denser and somewhat smaller behind, basal band and sutural blotch black, the latter very broad in both sexes. Colorado. 8. DISCOIDEUS (*Say*).

517. C. punctatus. Niger, pube longa pallida vestitus, prothorace lateribus rotundatis medio angulatis, dense punctato, sæpe rufo; elytris grosse punctatis, punctis postice minoribus, rufo-testaceis, margine basali maculaque elongata suturali plus minusve dilatata nigris; subtus niger vel testaceus. Long. 13—17 mm.

Oregon, Lord Walsingham; California, Dr. Horn. Easily recognized by the coarser punctures of the elytra; the sutural blotch varies greatly; in one ♂ it is a very narrow line, in two others it is a large, oval, elongate spot; in two ♀ it is broader, with the sides straight and parallel.

6. *C. hirtipes* Lec., Proc. Acad. Nat. Sci. Phila., vii, 16. *C. suturalis* Lec., from New Mexico, is perhaps a local variety of this species, but the prothorax is less densely punctured, the basal margin of the elytra is not black, and the body beneath is rufo-testaceous, the hind tibiæ are a little sinuate on the inner side, and the hind tarsi rather broader, with the 1st joint less elongated in the single ♀ in my collection.

8. *C. discoideus*; Callidium discoideum *Say*, Journ. Acad. Nat. Sci. Phila., iii, 411; Crossidius pulchrior *Bland*, Proc. Ent. Soc. Phila., i, 272; this beautiful little species represents in miniature the red variety of *C. punctatus;* the sutural blotch is broad, with parallel sides, and extends to the side margin by curving outwards about one-fifth the length from the tip.

CYLLENE Newm.

518. C. brevipennis. Nigro-picea, cinereo-pubescens, prothorace obscure ferrugineo, lateribus rotundato, versus basin utrinque vix excavato; elytris fasciis tribus angustis, base apiceque late testaceis, flavo-pubescentibus, antennis pedibusque ferrugineis; abdomine elytris multo longiore. Long. incl. abd. 18; excl. abd. 12.5 mm.

One specimen; Utah, collected by Dr. Leidy. The base of the prothorax is not excavated each side and the prosternum is not perpendicular behind; the species is easily recognized by the length of the abdomen, as well as by the fasciæ of the elytra being less numerous than in the allies of *C. pictus*, and by the prothorax not being fasciate.

CLYTUS Laich.

519. C. lanifer. Niger, flavo-pubescens, prothorace elytrorumque basi et sutura longius flavo-villosis, illo latitudine paulo longiore, basi constricto, lateribus subangulatim rotundatis, postice sinuatis, dense grosse punctato, linea brevi dorsali lævi; elytris sutura, fascia subbasali, altera transversa ad medium, 3iaque obliqua ante apicem flavis; scutello dense flavo-villoso; tibiis tarsisque ferrugineis. Long. 14 mm.

Owen's Valley, California; Dr. Horn. In the ♂ the antennæ are a little more than half the length of the body, and the front tarsi are much broader than in the ♀. The prothorax is quite distinctly tubularly constricted, and sinuate on the sides near the base; the hind tarsi are less slender than in *C. marginicollis;* the 1st joint is longer than the 2d and 3d, but not as long as all the others united. The front is short and rounded as in that species. It belongs to the Ochrestes group, but differs from any of the Mexican species which are thus far described.

XYLOTRECHUS Chevr.

The markings of the elytra in all the species of this genus may be reduced to an elementary form, consisting of a scutellar spot, an arcuated band extending along the suture to a little in front of the middle; an oblique band behind the middle, and the apical margin, which are covered with pale or yellow hair. In front of the arcuated band is inclosed a marking which is variable in form being sometimes (e. g. *colonus*) a slender sinuated transverse line; sometimes, as in most of the species, a spot; sometimes as in the three following species a line, directed inwards and backwards, but reaching neither margin nor suture. The bicarinated frontal elevation also differs in form in the different species, and affords good characters for distinguishing them.

520. X. convergens. Fusco-piceus, cinereo-pubescens, prothorace latitudine sublongiore, asperato, lateribus late rotundatis, basi tubulatim constricto disco plagis 4 flavo-pilosis ornatis; elytris apice late rotundatis, breviter mucronatis, sutura tota, linea hamata a basi ad medium juxta suturam extensa, dein extrorsum antice curvata, strigam obliquam tenuem includente, linea tenui pone medium extrorsum retrovergente, margineque apicali tenui pallide flavo-pilosis; antennis pedibusque (clava femorali excepta) ferrugineis; fronte flavo-pilosa, umbone elongata, plana, argute marginata, antice acuta. Long. 11 mm.

Ohio, one specimen, which I owe to the kindness of Mr. H. Ulke. A very distinct species by the elytral markings, which are narrow lines of mixed yellow and white hairs, and consist of the entire suture, the usual curved fascia concave forwards about the middle, an oblique line behind the middle, and the apical margin; in front of the curved fascia is an oblique line running inwards and backwards from the humerus, but not attaining either the margin or the sutural line. The four thoracic spots of yellow hair are placed, two transverse ones on the front margin, and two discoidal behind the middle. The femora are strongly clubbed, and the hind pair extend to the tip of the abdomen.

521. X. insignis. Nigro-piceus pubescens, fronte, oculorum sinubus, prothorace margine apicali et basali, elytrisque maculis solitis latis flavo-pubescentibus, macula antica inclusa retrorsum intus obliqua; prothorace rotundato, basi tubulatim constricto, subtiliter muricato; elytris apice rotundatis; frontis umbone bicarinata, antice subacuta, subtus maculis et fasciis flavo-pubescentibus. Long. 20 mm.

California, Dr. Horn. Our largest and most conspicuous species; easily known by the wide bright yellow markings, which consist of: frontal spot, emargination of the eyes; front and hind margins of prothorax, (the former almost interrupted at the middle); a basal spot near the scutellum, and joining the yellow hind margin of that part; a curved band commencing behind the scutellum, running along the suture nearly to the middle, then transverse and slightly curved forwards to the margin; a slightly oblique band behind the middle, and a broad apical margin; beneath, side spots of the pro- and metathorax, the posterior half of the episterna of the metathorax, four broad bands on the ventral segments, and the whole of the 5th segment are similarly clothed with dense yellow pubescence.

522. X. obliteratus. Nigro-piceus cinereo irroratus, prothorace magis rotundato, subtilius asperato, basi haud tubulatim constricto; elytris maculis solitis angustis testaceis indistinctis, macula antica inclusa retrorsum intus obliqua; elytris apice rotundatis, umbone frontali latiore, antice obtusa, medio canaliculata, haud acute bicarinata; subtus immaculatus. Long. 15 mm.

Colorado, two specimens; the markings of the elytra seem to be precisely as in *X. insignis*, but are narrow, and the black ground is sprinkled with short cinereous hair. The prothorax is more rounded on the sides, and not at all constricted at base.

This species is sometimes placed in collections as *X. mormonus* Lec., to which it has a strong resemblance in form, and by the indistinct markings, but differs by the asperities of the prothorax being very much finer, and by the frontal umbo, which in *X. mormonus* is broader, more acute in front, flat on the main surface, and margined by two sharp well-defined distant carinæ. The thighs are strongly clubbed, but do not extend to the tip of the abdomen.

NEOCLYTUS Thom.

N. muricatulus; Clytus mur. *Kirby*, Fauna Bor. Am. iv. 177 = C. leucozonus *Gory* and *Laporte*, Mon. pl. xvii, f. 105.

523. N. torquatus. Fusco-piceus pubescens, elongatus, prothorace latitudine longiore, carinulis brevibus transversis, serie triplici sitis, (quarum antica media major est), margine apicali et basali, fasciaque transversa ad medium flavo pubescentibus; elytris apice breviter acuminatis, basi fasciisque tribus flavo-pubescentibus, antica a sutura paulo ascendente, alteris retrorsum obliquis; subtus flavo-fasciatus, antennis pedibusque ferrugineo-fuscis, femoribus anticis dente subapicali spiniformi armatis. Long. 11 mm.

One specimen from Texas kindly sent me by Mr. A. Sallé. This species has the same form as *N. erythrocephalus*, but differs by the coarser sculpture of the prothorax (which is also less rounded on the sides), and by the bands of yellow pubescence; on the elytra the two hinder bands are more oblique backwards from the suture, and the front one is directed as much forwards in this species, as it is backwards in *N. erythrocephalus*. The front thighs are armed beneath on the posterior margin at the tip with a long slightly curved spine, represented in allied species, in the form of an obtuse slightly prominent tooth; the hind thighs extend to the tip of the abdomen.

N. longipes; Clytus long. *Kirby*, Fauna Bor. Am. iv, 176. I have seen this species in Parisian collections named *N. fulguratus* Thomson. It appears to be rare in the North, but more frequent in Texas; the dark-ground color of the elytra is sometimes thinly suffused with white pubescence, especially towards the base.

524. N. balteatus. Fusco-piceus, pubescens, prothorace latitudine paulo breviore, lateribus rotundatis, apice marginato, basi paulo angustiore, carinulis brevibus transversis serie media ornato, lateribus inordinatim asperatis, disco medio elevato, utrinque oblique declivi, fascia apicali basali et media (interrupta et sæpe deficiente), flavo-pubescentibus; elytris apice breviter acuminatis, fasciis tribus, margine apicali, scutelloque flavo-pubescentibus; subtus flavo-pubescens, prothoracis lateribus, episternis metathoracis antice, coxisque omnibus obscuris; antennarum basi pedibusque ferrugineis. Long. 14 mm.

Oregon; collected by Lord Walsingham. Of the same form as *N. erythrocephalus*, with the short carinæ of the prothorax fewer and less developed, the front one of the medial series being longer but scarcely higher than the others, the apex is distinctly margined; the middle fascia of the prothorax is feeble in one specimen, and slightly interrupted in the other, the apical and basal fasciæ are broad, and unite beneath at the prosternum. The elytral fasciæ are broad, the first and second are straight and transverse, the 3d inclines slightly backwards from the suture. The under surface is covered thickly with yellow hair in ♂, except on the flanks of the prothorax, and the front half of the side pieces of the metathorax; in the ♀ the yellow hair is much thinner, and the ground color appears to be ferruginous. The hind thighs of the ♂ extend beyond the tip of the abdomen, but not in the ♀.

525. N. interruptus. Fusco-piceus, pubescens, prothorace latitudine longiore, lateribus late rotundatis, apice marginato, basi angustiore, carinis transversis tribus ornato, 1mo pone apicem longiore, alteris pone medium brevibus, dense punctato et parce asperato, gutta parva basali media flavo-pubescente; elytris apice singulatim rotundatis, fasciis tribus scutelloque flavo pubescentibus; 1ma nec marginem nec suturam attingente, 2nda et 3ia marginem non attingente, hac obliqua; subtus obscure ferrugineus, episternis metathoracis postice, segmentoque ventrali 1mo flavo-maculatis. Long. 10 mm.

One specimen; California, collected by Mr. J. Behrens, and communicated to me by Dr. Horn. This species is also allied to *N. erythrocephalus*, and in well-preserved specimens the markings beneath would perhaps be similar; but in the one examined there are only two spots of yellow pubescence on each side; one on the hind part of the metathoracic episterna, the other at the side of the 1st ventral segment on its hind margin.

EUDERCES Lec.

526. Eu. Reichei. Piceo-ferrugineus, pilis longis erectis parcis vestitus, prothorace latitudine longiore, punctato, apice lævi, lateribus paulo rotundatis, basi late tubulatim pedunculato; elytris striga eburnea transversa haud obliqua ornatis, ante medium punctatis asperatis, basi paulo gibbosis, pone medium nigris politis. Long. 4—5 mm.

Texas; two specimens. I saw this species in the Oxford museum, and adopt the name there appended to it with great pleasure, as a deserved compliment to my excellent friend Mr. L. Reiche of Paris. It is smaller than *Eu. picipes*, and is easily distinguished from similarly colored varieties of that species by the prothorax being smooth near the apical margin, and not longitudinally plicate, but only punctured on the rest of the surface; the elytra are similarly sculptured, but the sub-basal tubercles are less developed, and the ivory band is exactly transverse, and not directly slightly backwards, as in that species. The antennæ are not spinose.

Eu. pini Fitch; Call. pini *Oliv.*, Cl. piniadens *Fabr.*, *Gory*, and *Lap.*, incorrectly referred by Lacordaire to Tillomorpha, is closely allied to *Eu. picipes*, and varies in color in the same manner; the prothorax is plicate, smooth at the apex for a long distance as in *Reichei*, but the sides are rounded in a different manner from the other two species, being more prominent and subangulated at the middle. The elytra are velvety for a space behind the ivory band, which is slightly oblique as in *picipes*, but the sub-basal elevation is more developed, and there is an oblique band of silvery hair at one-third from the apex, which is frequently accompanied towards the suture by a shorter line placed in front of it.

The eyes are completely divided as in the other species, but the upper lobe is much smaller, and reduced in fact to a very few lenses, thus approaching the genus Tillomorpha, in which the upper lobe is entirely wanting.

527. Eu. parallelus. Niger, prothorace longitudinaliter plicato, latitudine paulo longiore, ovato, lateribus rotundatis, basi multo angustiore; elytris confertim postice subtilius punctatis, usque ad medium velutinis, fasciis duabus eburneis transversis rectis parallelis ante medium signatis, anteriore intus abbreviata; antennis haud spinosis. Long. 5 mm.

Lower California, Mr. Ulke. Very different by the double elytral ivory fasciæ, which are transverse, not at all oblique.

The anterior one extends from the suture to the outer third, the hinder one is entire. The eyes are completely divided, as in the other species of the genus, with the upper portion small, narrow, and oval.*

ZAGYMNUS Lec.

528. Z. clerinus. Niger, pube erecta pallida sat dense vestitus; supra confertim fortiter punctatus, capite thoraceque rubris; elytris parallelis, apice rotundatis sutura prominula, macula subscutellari fasciisque duabus latis aurantiacis, his ad suturam interruptis et ad marginem conjunctis; subtus nitidus punctatus. Long. 13 mm.

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* It is proper to note here the occurrence in Texas of *Gnaphalodes trachyderoides* Thoms., a remarkable Mexican species. The genus belongs to Group II of Cerambycini, and would be properly placed in the table (Classif. 302) before Chion, with the following definition:—

Prothorax with lateral spine behind the middle; antennæ densely fringed beneath, *inner* angle of joints 4–7 spinose; elytra bispinose at tip; episterna of metathorax wide, scent pores distinct. GNAPHALODES.

The scutellum is triangular, larger than in Chion, and the eyes are less coarsely granulated: the prosternum is perpendicular behind, and the mesosternum convex. The body is brown, uniformly clothed with gray-brown pubescence, paler and more dense on the scutellum.

Aneflus prolixus. Piceus, dense breviter cinereo-pubescens et pilis raris volatilibus pilosus, prothorace punctato, fere cylindrico, latitudine longiore, linea transversa tenui ante medium, tuberculoque utrinque prope basin ornato; elytris thorace latioribus, punctatis, punctis postice subtilioribus, alterisque majoribus piliferis intermixtis, apice longe bispinosis; antennarum articulis 3–6 spina brevi armatis. Long. 25 mm.

One pair, Cape San Lucas, Mr. Xantus. This fine species differs from the others by the antennæ being armed with small spines; they are very distinctly carinate, in the ♂ are nearly as long as the body, and in the ♀ scarcely two-thirds as long. The under surface and legs are finely pubescent, and speckled with darker punctures from which proceed the flying hairs. The 5th ventral of the ♂ is slightly truncate, emarginate. The last joint of the palpi is elongate triangular, less dilated than in *A. volitans*, and transversely truncate; the appearance of a transverse line across the disk of the prothorax in front of the middle is the result rather of the arrangement of the pubescence than of a positive elevation; the tubercle each side is transverse, near the base, and nearer the side than the median line; there are a few large scattered darker punctures upon the sides.

This fine species was overlooked in my boxes until too late to print the description on p. 186, where it properly belongs.

One specimen from Florida, given me by Dr. E. Brendel; another in the collection of Mr. Ulke is entirely black. I have mentioned, on p. 321 of the Classification, some of the structural differences between this and *Agallissus gratus* (Hald.), which entitle them to rank as distinct genera; and which may be briefly summed up as follows: in Agallissus *Dalman*, front quadrate oblique, prothorax rounded on the sides; elytra gradually narrowed behind, broadly truncate, and serrate at tip, with the sutural spine quite prominent; body finely punctured above, smooth beneath: in Zagymnus, front short, vertical, prothorax longer than wide, feebly rounded on the sides; elytra parallel, not narrowed behind, rounded at tip, with the sutural spine small, body very coarsely punctured above, moderately punctured beneath.

The narrow epipleuræ are in this tribe suddenly and strongly sinuate near the base, a singular character, which attracted my attention before I was acquainted with the description of Dalman, and induced me to place the only species known to me as a distinct primary group of the subfamily Cerambycidæ.

NECYDALIS Linn.

529. N. cavipennis. Elongatus, nigro- vel rufo-piceus, pube longa sericea flava dense vestitus, prothorace latitudine longiore, antice posticeque profunde constricto, lateribus bisinuatis medio obtuse tuberculatis, disco parce punctato, linea dorsali profunda utrinque abbreviata; elytris testaceis base apiceque fuscis, alutaceis, vix punctatis, planis, apice subito elevatis et tumidis, margine laterali paulo elevato; pedibus sæpe ferrugineis, antennis crassiusculis, articulo 4to contiguis sesqui breviore. Long. 18—22 mm.

San Francisco, collected by Mr. J. Behrens. Of the same form as *N. lævicollis*, but easily known by the antennæ being stouter, with the 4th joint comparatively shorter; by the long and dense pubescence; by the prothorax (when the pubescence is abraded) being sparsely punctured, and by the elytra being impressed nearer the apex, and more suddenly concave. The color varies; one specimen is black, with exception of the disk of the elytra, and the peduncle of the thighs; in another the antennæ, legs, and elytra are ferruginous, with a dusky cloud on the latter.

LEPTALIA Lec.

This genus is established on *Anoplodera macilenta* Mann. It is allied to Encyclops, having nearly the same form of head, constricted suddenly but slightly, far behind the eyes, which are finely granulated, and feebly emarginate on the inner side; the hind angles of the head are obtuse and rounded; the antennæ are long and slender, as in Encyclops, and the 4th joint is a little shorter than the 3d and 5th, they are inserted well up on the front, which is less vertical than in Encyclops, and the mouth is a little longer. The last joint of the palpi is triangular and obliquely truncate. The prothorax is narrower than the head, longer than wide, deeply constricted before and behind, and the sides are obtusely but strongly dilated. The elytra are wider than the thorax, elongate, parallel, feebly truncate at tip. Legs slender, tarsi long, 1st joint of all much longer than the 2d, of the hind tarsi the 1st and 2d joints are feebly sulcate, with a narrow line of pubescence each side; 3d joint of all the tarsi dilated and deeply bilobed, as in Encyclops.

The species is black, densely punctured, the head and prothorax more finely than the elytra. Varieties occur with yellow elytra, with the suture and broad sublateral vitta black; A. Frankenhæuseri *Mann.*, is a variety in which the elytra have only the black vitta, and the legs are testaceous; Leptura fuscicollis *Lec.* is a larger variety from California, of still paler color, the body being testaceous, and the elytral vitta very indistinct.

CENTRODERA Lec.

530. C. nevadica. Fusco-testacea, helvo-pubescens, prothorace confertim subtiliter punctato, latitudine vix longiore, convexo, leviter canaliculato, antice posticeque constricto, tuberculis lateralibus obtusis; elytris thorace sesqui latioribus apice rotundatis, subtilius versus basin autem distinctius punctatis; antennis (♀) corporis ⅔ haud longioribus, articulo 4to 3io breviore, conjunctis 5to æqualibus. Long. 17 mm.

One female; Virginia City, Nevada, Mr. Edwards. By the obtuse tubercles of the prothorax this species resembles *C. sublineata*, but the punctuation is finer, the prothorax is scarcely narrower at tip than at base, and there is no appearance of lines on the elytra. The antennæ are shorter and stouter, but this is in part or in whole a sexual character, the ♀ of *C. sublineata* being unknown to me.

XYLOSTEUS Friwaldsky.

531. X. ornatus. Niger, capite thoraceque dense punctatis, elytris fortiter punctatis, maculis utrinque duabus flavis marginalibus ornatis, versus apicem sublævibus. Long. 14 mm.

One female, Oregon; collected by Lord Walsingham, and kindly given me by Mr. G. R. Crotch. The antennæ are about three-fourths the length of the body. This species resembles entirely the figure of the European *X. Spinolæ*,* except that the basal and subapical spots of the elytra are wanting, and only the two marginal ones remain; these are transverse, and directed towards each other in a diagonal direction, and extend nearly one-half the breadth of the elytra. The genus is very closely allied to Centrodera *Lec.*, and differs only by the eyes being smaller, less transverse and less prominent, and by the sides of the head being prolonged behind the eyes, suddenly but feebly constricted at the base (somewhat as in Encyclops, etc., though to a less degree), instead of being obliquely narrowed to the neck. These differences are not generic in Acmæops, nor is the form of the head and eyes constant in Leptura. I am therefore disposed to believe that the two genera are not sufficiently distinct. Those who agree to combine them will adopt the generic name *Xylosteus* as having many years priority over Centrodera *Lec.*

TOXOTUS Serv.

532. T. obtusus. Testaceus subtilissime pubescens, capite fusco, prothorace latitudine haud longiore, lateribus bisinuato, tuberculo laterali obtuse rotundato, disco convexo, antice et postice transversim modice constricto, vage canaliculato; elytris vix punctulatis, fere parallelis, apice rotundatis; oculis parvis, subtiliter granulatis. Long. 15 mm.

One denuded specimen from Yellowstone basin, Dr. Horn, and another well preserved in Mr. Ulke's collection. Differs from all the other species before me by the less deeply constricted prothorax and more obtusely rounded lateral tubercles; the eyes are smaller than usual, and finely granulated, but more convex than in *T. vestitus*, with which it agrees in this character; the 3d and 5th joints of the antennæ are equal, and the 4th is two-thirds as long; the head is feebly narrowed behind, but not rounded on the sides. The pubescence is extremely short and fine. The species of this genus are not alike in the eyes; in *T. cinnamopterus* they are much larger, and less finely granulated, than in any of the others.

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* Vide Du Val, Gen. Col. Eur., iv. pl. 56, f. 262.

PACHYTA Serv.

533. P. armata. Nigra, opaca, pube erecta villosa, capite thoraceque confertissime punctatis, hoc apice et basi profunde constricto, basi multo latiore, spina laterali valida elongata, apice rotundata; elytris basi prothorace multo latioribus, postice sensim valde angustatis, apice truncatis, nitidis glabris, flavo-testaceis, pone medium extrorsum oblique nigris, parce punctatis, punctis versus humeros asperatis. Long. 19 mm.

Oregon; Mr. Ulke. Related to *P. liturata* Kirby (nitens *Lec.*), but much broader, with entirely different sculpture, and with much longer thoracic spines; the humeral regions of the elytra are very prominent, and the disk is broadly concave inside of them; a broad oblique groove runs from below the humeral prominence on to the dorsum of the elytra where it is lost; the black space extends along the outer margin obliquely from just behind the middle to the sutural tip. The antennæ and other organs are as in *P. liturata.*

534. P. rugipennis. Nigra, subænea, pube brevi minus subtili parce vestita, antennarum, femorum tibiarumque basi ferruginea; elytris apice rotundatis, rude punctatis, et lineis elevatis fortiter reticulatis, fascia transversa cerina angusta ad medium ornatis. Long. 13—16 mm.

One pair, Canada. The male has the antennæ two-thirds as long as the body, and the elytra slightly narrowed from the base; in the female the antennæ are shorter, and the elytra broader, and parallel on the sides. The head and thorax are densely and coarsely punctured, the latter narrower in front, with the usual transverse constrictions before and behind; the lateral tubercle is acute; the disk is feebly foveate each side, and the dorsal line is narrow and somewhat channelled. The sculpture of the elytra is very peculiar, consisting of a reticulation of smooth, strongly elevated lines with the depressed spaces coarsely punctured, from the punctures proceed rather coarse golden hairs; at the middle there is a narrow transverse waxy band.

I have seen specimens of this insect in the British Museum under the names P. rugipennis †*Newman*, and P. bimaculata †*Dej.* I have adopted the former as being more applicable.

ANTHOPHILAX Lec.

535. A. tenebrosus. Niger, subnitidus, capite thoraceque confertim subtilius punctatis, hoc antice posticeque modice constricto, tuberculo laterali brevi obtuso; elytris (♀) thorace latioribus, parallelis apice rotundatis, antice parce fortiter, versus suturam et pone medium subtiliter punctatis. Long. 12 mm.

One female; southeastern California, Dr. Horn. Not unlike in form the stouter species of Acmæops, but the eyes are larger, subtriangular, and strongly and broadly emarginate at the antero-interior side. The antennæ are a little more than half the length of the body, and stout; the 4th joint is two-thirds as long as the 5th, and a little shorter than the 3d. The punctures of the head and prothorax are rather fine, and the latter is not channelled. The elytra are somewhat shining, sparsely and not finely punctured at the base, and along the sides beyond the middle, the punctures becoming gradually finer towards the suture and behind, where the surface is nearly opaque.

A. mirificus Bland, is a much larger species, with much more coarsely punctured head and prothorax, the latter broadly channelled, and the elytra punctured and rugose before the middle, opaque and scarcely punctured behind. It is found in Colorado.

ACMÆOPS Lec.

I regret to say that owing to the want of sufficiently extensive sets of specimens I have unnecessarily multiplied the species of this genus, on slight differences in color, pubescence, or sculpture, which larger collections have shown to be merely individual, and not of specific value. With the increased material now accessible I would arrange the species as follows:—

A. Short stout species, with the head narrowed behind but not constricted, antennæ rather stout (except in thoracica), with the 4th joint distinctly shorter than the 5th; elytra of ♀ somewhat dilated on the sides.

a. Prothorax with the lateral angle distinct, sides, therefore, behind the middle concave in outline;

Black, prothorax yellow, densely pubescent, elytra densely punctured; base of tibiæ yellow, var. *incerta* Bland. 1. THORACICA (*Hald.*)

Color variable, very slightly pubescent, elytra sparsely punctured, punctures larger towards the base. *α.* Thorax with two black spots, or black disk; elytra yellow with two black vittæ, legs yellow or black, *bivittata* Say. *β.* Yellow, head and elytra black, antennæ dusky, base testaceous *nigripennis* Lec. γ. Black; varies with 1, legs yellow; 2, prothorax yellow; 3, prothorax yellow with two black spots, *varians* Lec. δ. Testaceous, head dusky, *fusciceps* Lec. 2. BIVITTATA (*Say*).

Blackish-blue, elytra more coarsely and sparsely punctured (pubescent ?) lateral angle of prothorax obtuse but less prominent. 3. ATRA *Lec.*

Greenish-bronze, pubescent, elytra coarsely and sparsely punctured (general form less stout, and lateral angle of prothorax more rounded, and less prominent). 4. SUBÆNEA *Lec.*

b. Prothorax with the lateral angle rounded, not prominent, sides straight and parallel behind;

Testaceous (feebly pubescent ?) punctures of elytra irregular toward the base. 5. PINGUIS n. sp.

Dark metallic, pubescence soft and long, elytra more densely punctured, more finely towards the tip. Varies, dark-blue, *tumida* Lec.; black, *lugens* Lec.; blue with longer and better preserved pubescence, *mollipilosa* Lec.; dark testaceous, sides blackish-bronze, *fusca* Lec. Smaller, elytra less densely punctured, *californica* Lec.; with elytra brighter blue, *subcyanea* Lec. 6. TUMIDA *Lec.*

B. More elongate species, antennæ on a line with the front margin of the eyes, slender, 4th joint scarcely shorter than 5th; prothorax campanulate, constricted before and behind, hind angles frequently prominent, tarsi longer and more slender, with 3d joint rather more broadly bilobed; 1st and 2d joints of hind tarsi not brush-like beneath, (precisely as in Leptura).

a. Disk of prothorax convex, channelled; elytra rounded at tip; hind angles of head obtusely rounded except in 10 and 11;

Prothorax wider than long;

Hind angles not prominent, elytra more densely punctured, with a red humeral spot. 7. MILITARIS *Lec.*

Hind angles distinctly prominent, elytra less densely punctured, black sometimes testaceous. α. Elytra with testaceous vittæ, *dorsalis* Lec. *Subpilosa* was founded on abraded specimens; *lupina* Lec., on one in which the long pubescence is preserved. 8. SUBPILOSA *Lec.*

Prothorax longer than wide, more strongly constricted in front;

Elytra more sparsely punctured;

Sides of head parallel behind the eyes. α. Elytra entirely black. β. Elytra with testaceous vittæ. γ. Elytra testaceous, margin black, *marginalis* Lec. 9. LONGICORNIS *Kirby.*

Sides of head oblique behind the eyes; hind impression of prothorax deeper;

Prothorax more densely punctured. 10. VINCTA *Lec.*

Prothorax shining, less densely punctured. 11. LIGATA n. sp.

Elytra more densely punctured with short pubescence, base red; head and prothorax clothed with golden hair, the former feebly, the latter strongly constricted at base. 12. BASALIS n. sp.

b. Disk of prothorax convex not channelled, sparsely and finely punctured, elytra rounded at tip;

* Sides of head behind the eyes straight, oblique; neck concave: ♂ with the front tibiæ armed on the inner side with an obtuse tooth at the middle, outline concave from the tooth to the tip.

Testaceous, elytra coarsely punctured, with the suture, dorsal vitta and side margin (the latter sometimes interrupted into spots) black; *quadrivittata* Linn, (fide *Hald.*). 13. DIRECTA *Newm.*

** Sides of head behind the eyes tumid, rounded, smooth, prothorax more deeply constricted behind; (♂ ?)

Black, with fine hoary pubescence, mouth and prothorax ferruginous. 14. FALSA Lec.

c. Disk of prothorax more or less flattened behind, and prolonged or elevated each side into a tubercle; elytra truncate at tip.

Prothoracic tubercles conical lateral; black, elytra opaque, base and side margin and sometimes the suture bright red. 15. DISCOIDEA (*Hald.*).

Prothoracic tubercles dorsal obtusely rounded; black, elytra shining, more distinctly punctured, black, striped, testaceous, or fuscous. a. Tubercles less developed, *gibbula* Lec. 16. PROTEUS (*Kirby*).

C. A moderately stout but small species, with the front and mouth extremely long, the antennæ inserted in front of the line joining the anterior margin of the eyes; prothorax campanulate, constricted in front, wider and feebly constricted behind: tip of elytra truncate.

Black, elytra black, fuscous, or testaceous, sometimes with a dorsal vitta and tip fuscous, *strigilata* Fabr., *longiceps* Kirby, *fulvipennis* Mann. 17. PRATENSIS *Laich.*

536. A. pinguis. Fusco-testacea, pallide pubescens, obesa, prothorace latitudine breviore, lateribus postice parallelis, antice rotundatis, apice angustiore constricto, confertim punctato, spatio dorsali præcipue postice lævi; elytris latioribus convexis, parce punctatis, punctis postice subtilioribus, versus basin autem irregularibus, vittis indistinctis sublævibus relictis. Long. 9 mm.

One specimen; California, Dr. Horn. A very stout species, shaped like *A. bivittata*, but with the sides of the prothorax straight and parallel behind the middle, as in *A. atra*, and quite distinct from them as from all others by the punctures of the basal half of the elytra being arranged so as to give the appearance of faint longitudinal stripes, of which the inner one runs obliquely forwards towards the humerus, so as to tend to unite with the others. The antennæ and legs are dark piceous, the former rather stout, with the 3d and 4th joints equal.

537. A. ligata. Nigra nitida, breviter parce pubescens, elongata, capite confertim punctato, pone oculos oblique angustato, et late rotundato, prothorace latitudine longiore, antice et postice profunde constricto, dorso canaliculato, utrinque convexo, minus dense punctato, vitta dorsali lævi, lateribus subangulatis, angulis posticis paulo prominulis; elytris thorace latioribus apice rotundatis, profunde haud dense punctatis; antennis tenuibus elongatis. Long. 8—12 mm.

α. Elytris vittis duabus obliquis testaceis, interiore postice, exteriore antice abbreviata; antennis pedibus plus minusve testaceis.

β. Elytris testaceis, sutura nigricante; antennis pedibus plus minusve testaceis.

Montana; this species is closely allied to *A. longicornis* and *vincta;* but is distinguished from the former by less robust form, and by the head being obliquely narrowed behind the eyes, and from both by the prothorax being less densely punctured, more shining, and more constricted, especially at the base; the pubescence in all three is very short and sparse.

538. A. basalis. Nigra, capite thoraceque dense punctatis aureo-pilosis, hoc antice posticeque constricto, lateribus obtuse tuberculatis, vel potius bisinuatis, linea dorsali lævi; elytris thorace latioribus, elongatis fere parallelis, apice subtruncatis, parce breviter albo-pubescentibus, punctatis, punctis postice subtilioribus, fascia basali rubra parcius punctata, femoribus anticis ferrugineis. Long. 10 mm.

California; Dr. Horn. A slender species, proportioned somewhat like *A. longicornis*, but with the elytra more flattened, and more densely punctured. The head is gradually narrowed behind the eyes, as usual, but is very distinctly constricted though not strongly at base, showing thus an affinity with the Encyclops tribe; I should be disposed to place it in that tribe, next to Leptalia, but the mouth is too long, and the front not sufficiently vertical to warrant it.

STRANGALIA Serv. emend. Lec.

The poriferous system of the antennæ is contained in small oval spaces, situated near the tip of the 6th and following joints, the 11th joint is not appendiculate, and has but one sensitive space each side, and not two, as in Typocerus; but in species 5 and 6 there is in ♂ an attempt at a double system of impressions on the 6th and following joints.

A. Body very elongate; 5th ventral of ♂ very deeply excavated, so as to appear emarginate, lateral lobes thin, expanded; (elytra not fasciate).

* Hind tarsi with third joint scarcely emarginate;

Ferruginous, antennæ thicker; elytra more coarsely punctured with pale sutural markings, (4th ventral ♂ with a broad apical impression). Texas. 1. VIRILIS n. sp.

** Hind tarsi with 3d joint strongly emarginate;

Above testaceous, head sometimes fuscous, antennæ blackish, slender; prothorax with two broad black vittæ, elytra less coarsely punctured, with black marginal spots; beneath usually dark, abdomen sometimes, and legs partly, testaceous. (Varies entirely black, also entirely pale, with the antennæ, and parts of the legs dark). Atlantic States. 2. FAMELICA *Newm.*

Black, elytra more coarsely punctured, pale, with margin and suture blackish; tip less acuminate, and more distinctly truncate than in the preceding, than which it is smaller and more slender. (Varies entirely black.) Middle States. 3. ACUMINATA (*Oliv.*)

B. Body very elongate, 5th ventral of ♂ more or less excavated, but not emarginate, lateral lobes not, or only moderately, expanded; 3d joint of hind tarsi emarginate;

Ferruginous, elytra with two transverse testaceous bands. Florida. 4. STRIGOSA *Newm.*

Rufo-testaceous, prothorax with two vittæ, elytra with three transverse bands black; hind thighs black at the tip. Atlantic States. 5. LUTEICORNIS (*Fabr.*)

Ferruginous, elytra black. Atlantic States. 6. BICOLOR (*Swed.*)

C. Body less elongate, 5th ventral of ♂ only triangularly impressed; 6th joint of antennæ without sensitive spot.

Ferruginous, elytra paler, with three large spots extending from the margin nearly to the suture. Atlantic States. 7. 6-NOTATA *Hald.*

539. S. virilis. This species resembles in form *S. strigosa*, but is larger (15—19 mm.); the color above is ferruginous brown, thinly clothed with fine yellow pubescence. The antennæ (♂) are stouter than in any other species, and are about two-thirds the length of the body. The prothorax is one-third longer than the basal width, gradually narrowed in front, very feebly sinuate on the sides, not impressed behind, densely punctured with two fuscous badly defined vittæ; elytra acutely acuminate behind, and slightly dehiscent, extending to the tip of the 3d segment, more coarsely and less densely punctured than in *S. famelica*, with a scutellar spot, and two sub-sutural triangular ones connected along the suture, paler testaceous, and covered with yellow hair. Beneath fuscous, legs ferruginous, outer half of hind thighs, tibia, and tarsi fuscous. The sexual characters are more strongly developed than in any other species in our fauna. The 5th abdominal ring is much swollen, the dorsal segment convex, the ventral one very deeply excavated, with the sides laminate, broadly impressed externally, and obtusely pointed at the end; the excavation occupies not only the whole of the under surface of the segment, but extends over half of the 4th ventral, as a shallow impression; the hind tibiæ are thickened at the outer end, and acutely carinate on the inner margin for the lower third; the 3d joint of the hind tarsi is nearly one-half as long as the 2d, and scarcely emarginate. Texas.

TYPOCERUS Lec.

The species of this genus have not been increased since the publication of my first memoir on Cerambycidæ; but as the study of typical specimens in the British Museum has enabled me to arrange definitely the synonymy of Mr. Newman's species, I have prepared the following table:—

A. Antennæ black with the 6th and following joints with impressed poriferous spaces; prothorax not strongly rounded on the sides:
  a. Prothorax very coarsely punctured
    * Prothorax margined before and behind with golden hair, legs ferruginous;
Elytra acutely acuminate, chestnut colored, with indistinct yellow bands; prothorax narrowed from the base, sides subsinuate; 1. BADIUS.
Elytra less acutely acuminate, obliquely truncate, black, with three bands and two basal spots yellow. 2. ZEBRATUS.
    ** Prothorax at base margined with grayish hair, legs and antennæ black;
Elytra with a broad angulated yellow spot extending from the base to the side margin, inclosing the humeral angle. 3. LUNATUS.
  b. Prothorax more densely, less coarsely punctured; pubescence golden, denser at base and tip; legs ferruginous;
Elytra brown with four yellow bands, frequently imperfect or obsolete, tip sub-obliquely truncate, and feebly bispinose. 4. VELUTINUS.
Pubescence black, grayish at the base; body entirely black, tip of elytra obliquely truncate, shortly acuminate. 5. LUGUBRIS.
B. Prothorax strongly punctured, much rounded on the sides before the middle; pubescence long, grayish, denser at the base, but not golden; elytra with four yellow bands, more or less confluent, the anterior one basal, the 2d and 3d frequently connected near the suture; tip subtruncate, not spinose; legs ferruginous, antennæ brown:

Antennæ stouter, 6th joint of, with large impression in ♂.
6. BRUNNICORNIS n. sp.
Antennæ more slender, joints 3—5 longer, 6th without impression in either sex.
7. SINUATUS.

1. *T. badius* Newm. Entomologist, 69. This species resembles *T. velutinus*, in the color of the elytra, but has the prothorax very coarsely punctured as in *T. zebratus*. In form it is similar to the latter but the elytra are more obliquely truncate at tip and more acutely acuminate, and the sides of the prothorax are feebly sinuate. Specimens may perhaps occur with perfect yellow elytral bands, but in the individual before me only a few traces remain. One ♂ from Florida was kindly given me in exchange by the British Museum.

2. *T. zebratus* Lec. J. Acad. Nat. Sci., 2d, 1, 334. Leptura zebrata *Fabr.* Syst. El. 2, 364; L. zebra *Oliv.* L. carolina *Weber*, Obs. Ent. 91.

3. *T. velutinus.* Leptura velutina *Oliv.*, 73, 3, 32. L. fugax *Fabr.* Syst. El. 2, 359. L. tenuior *Kirby*, Fauna Bor. Am. iv., 181; L. nobilis *Newman!* Entom. 69.

540. T. brunnicornis. Niger, pallide pubescens, abdomine pedibusque ferrugineis, prothorace latitudine paulo breviore, a basi antrorsum angustato, lateribus ante medium rotundatis, confertim fortiter punctato, basi densius pubescente; elytris punctatis, punctis postice subtilioribus, subtiliter pubescentibus, apice truncatis, nigris, fascia lata basali alterisque tribus flavis; antennis fuscis basi ferrugineis. Articulo 5to apice latiore, sequentibus impressis. Long. 10—13 mm.

Texas; three males; the 2d and 3d elytral bands are a little wider towards the suture, which they do not quite reach; the hindermost band is a spot, also wider towards the suture but attains neither it nor the side margin; the tip is truncate not at all toothed.

This species exactly resembles in form and sculpture *T. sinuatus*, but differs by the elytra being more shining, and less pubescent, and by the antennæ being stouter, with the joints 3—5 obviously less slender, the 5th distinctly dilated at the outer end like the following joints, all of which are furnished with sensitive spaces.

7. *T. sinuatus* Lec., l. c. 335, *Leptura sinuata* Newm. *Stenura 8-notata* Hald. Varies greatly, the bands of the elytra being more or less developed, and the ground color either black or

brown; the dark portions tend to become confluent longitudinally between the side margin and the suture.

I have included under this name several forms which will be eventually placed as distinct species, but which I am unable at present to properly define, in consequence of want of sufficient material. They are follows:

α. Antennæ of both sexes more slender than in the other forms, with moderately large sensitive spaces. Last ventral segment, in four specimens before me, subtruncate and slightly declivous at tip, anal plate simple, pygidium feebly emarginate; abdomen yellow in three specimens from the Middle States, dark in one specimen from Kansas; elytra yellow, with spots moderate in size, longitudinally confluent.

β. Antennæ rather heavier than in α, longer in ♂, with moderately large sensitive spaces, shorter in ♀, with much smaller spaces. Last ventral segment of ♂ deeply excavated for nearly half its length; anal plate excavated and hairy, of ♀ subtruncate and feebly impressed, pygidium subtruncate in ♂, emarginate in ♀. Elytra in two specimens (♀) marked like the preceding, in three ♂ dark with narrow remnants of the yellow bands. Kansas.

γ. Antennæ as in β, longer in ♂ with small sensitive spaces. Last ventral, segment anal plate and pygidium of ♂, as in β; in ♀ with a transverse carina or plate near the tip; pygidium not emarginate; elytra castaneous, with faint traces of yellow spots, Indian Territory, Dr. Horn.

δ. Antennæ as in β and γ, last ventral segment ♀ with a small elevated tubercle near the tip, pygidium not emarginate. Elytra with large spots, more or less confluent. Two ♀; Kansas.

ε. Antennæ ♂, as in the preceding, but ferruginous, as are the legs and abdomen; last ventral feebly impressed as in ♀ of β, and pygidium very feebly emarginate. Elytra bright-yellow, with the spots clearly defined, the 1st and 3d forming bands. One specimen, Texas. (The pubescence seems shorter than in the other forms, but has been in great part abraded.)

LEPTURA Linn.

The species of this genus are very numerous, especially in the northern and northwestern parts of the continent, and may be conveniently arranged as follows:—

A. Prothorax more or less triangular, or campanulate, widest at the base, hind angles prolonged; STENURA *Serv.*
  a. Prothorax strongly narrowed from the base, which is broadly but deeply bisinuate, posterior transverse impression distinct; elytra widest at the base, gradually narrowed behind, truncate and emarginate at tip, which is not margined;

* Antennæ feebly serrate; 5th ventral ♂ flattened, broadly truncato-emarginate, and bidentate; mouth short, hind angles of head more prominent;

Black, velvety pubescent, elytra red with the apex black;

Elytra not sulcate; prothorax sparsely punctured. 1. EMARGINATA.

Elytra sulcate; prothorax densely punctured. 2. GIGAS n. sp.

** Antennæ filiform; 5th ventral ♂ broadly truncato-emarginate and bidentate; mouth long, hind angles of head less prominent;

§ 1. Prothorax densely not finely punctured;

Elytra yellow, with anterior blotch (frequently wanting), medial band and apex black; feet varied black and yellow; sides and base of prothorax sometimes yellow, antennæ usually annulated;

Antennæ long and slender: α, tip of elytra ferruginous, *obliterata* Hald.; β, tip of elytra black, *vitiosa* Lec. 3. OBLITERATA.

Antennæ stouter, not annulated, elytra with middle and posterior band black. 4. SOROR n. sp.

Elytra yellow, more obliquely truncate at tip, lateral spot near the middle, suture behind, and apex black; legs, antennæ, and body black. 5. PROPINQUA.

Elytra yellow, with vague medial and posterior bands interrupted at the suture, sides of prothorax, abdomen, and legs testaceous; tarsi, tip of posterior tibiæ and hind femora fuscous; narrower than *obliterata* with the ♂ antennæ longer, and 11th joint very distinctly appendiculate, and prothorax more sinuate on the sides. 6. DELETA.

§ 2. Prothorax more finely punctured;

Black, elytra luteo-testaceous, tip blackish; 3d, 4th, and base of 5th ventral segments red; α, elytra black. 7. PLEBEJA.

More slender, antennæ annulate with yellow; ♂ black, base of legs yellow; elytra with base of epipleuræ yellow; and broad vitta dilated at base interrupted at the middle, and abbreviated at two-thirds the length; *subhamata* Randall, *interrupta* Newm., *armata* Hald.; ♀ testaceous, disk of prothorax, scutellum, suture, side margin, transverse spot at middle of elytra, and tip black; legs varied with black; varies with the prothorax marked only with a narrow black vitta, *elegans* Lec. 8. SUBHAMATA.

§ 3. Prothorax strongly less densely punctured;

Much broader and stouter, hind impression of prothorax very deep, abdomen red, base and tip blackish: ♂ black, abdomen red, *abdominalis* Hald.; ♀ yellow, occiput, two prothoracic spots, knees, tips of tibiæ, and tarsi black, elytra with side margin and oblique vitta yellow, *atrovittata* Bland; varies with the trunk fuscous, and prothorax with the disk black. 9. ABDOMINALIS.

Broad, black, prothorax deeply impressed behind, elytra sanguineous, with a very broad common discoidal stripe not reaching the base, abdomen sanguineous. 10. PLAGIFERA n. sp.

Smaller, black, prothorax less deeply impressed; elytra with a spot near the base, two bands, and a spot near the tip yellow. 11. AMABILIS.

§ 4. Prothorax densely punctured, feebly impressed; form slender;

Prothorax not sinuate on the sides, fuscous finely pubescent; elytra testaceous, suture, dorsal vitta, and submarginal spots blackish; legs testaceous, antennæ annulate; *indirecta* Newm., *cincta*‖ Hald., *lateralis* Lec. 12. LINEOLA.

Black, clothed with short yellow pubescence, elytra dark testaceous, coarsely punctured, tip sometimes black. 13. RUBIDA n. sp.

b. Prothorax nearly smooth, strongly and gradually narrowed from the base, which is bisinuate, hind impression very deep; elytra very coarsely punctured, not narrowed, very dehiscent, rounded, subacuminate, and distinctly margined at tip;

Black, sides of elytra, metathorax, and abdomen red; thighs red, with the tips black. 14. CRUENTATA.

c. Prothorax punctured, without hind impression, campanulate but subquadrate, hind angles small; elytra parallel, genæ very short; 5th ventral ♂ ♀ rounded at tip;

* Elytra rounded and margined at tip;

Black, elytra blue, polished, coarsely and sparsely punctured, antennæ and legs either black or yellow. 15. CHALYBÆA.

Black, head and prothorax bright rufous;

Elytra shining, very coarsely punctured, tip subtruncate; prothorax without impressions. 16. CAPITATA.

Elytra densely not coarsely punctured, tip rounded; prothorax impressed near the hind angles. 17. AMERICANA.

Black, hoary with fine white pubescence, prothorax dull red. 18. HÆMATITES.

Black with white pubescence, head and prothorax golden-pubescent; prothorax yellow with a black discoidal spot, front thighs and base of middle thighs yellow. 19. SAUCIA.*

** Elytra scarcely or not margined at tip;

Dull-black, hoary with fine white pubescence, especially on the prothorax which is densely punctured; elytra coarsely punctured;

Head dull ferruginous; front legs and base of middle thighs testaceous. 20. RUFICEPS.

Entirely black. 21. SUBARGENTATA.

Black, legs and scape of antennæ ferruginous; *rufibasis* Lec.; *a*, tarsi, tip of hind thighs and part of hind tibiæ blackish. 21. SIMILIS.

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* *L. nona* and *exigua* Newm. are allied to *saucia;* the first is black with the base of the thighs yellow, the second has the scape of the antennæ and front legs yellow, and the prothorax golden-pubescent; I have seen only the types in the British Museum.

Dark-blue, elytra with red humeral spot sometimes wanting; *militaris* Chev. 22. MOLYBDICA.

d. Prothorax transversely depressed at the base, convex, much rounded on the sides before the middle, hind angles small (except in *impura*); elytra at base wider than prothorax, more or less narrowed behind, usually black, spotted or banded with yellow; genæ moderately long (shorter in ***);

* Prothorax transversely excavated along the whole base, sides sinuate, tip strongly tubular; body beneath, margins of prothorax and elytral bands golden-pubescent; tip truncate, legs ferruginous;

Yellow bands broader at the suture;

Antennæ very stout, dark ferruginous. 23. LÆTA.

Antennæ more slender, nearly black; *quagga* Germ. 24. NITENS.

Bands equal straight, antennæ stout, blackish. 25. TRIBALTEATA n. sp.

** Prothorax feebly excavated each side near the hind angles; pubescence not golden;

Brownish-yellow, densely clothed with fine pubescence, hind angles of prothorax more explanate and prolonged; elytra with a faint lateral fuscous spot at the middle. 26. IMPURA.

Prothorax narrowed from the base, sides subsinuate; elytra yellow, with two marginal spots and tip black, the later dehiscent, not truncate. 27. CORDIFERA.

Prothorax not narrowed from the base, sides sinuate, rounded in front, elytra with yellow bands or spots variously confluent, sometimes entirely black; suture dehiscent, tip rounded; *instabilis* Hald., *convexa* Lec. 28. INSTABILIS.

Prothorax not wider than long, more finely and densely punctured, body less robust, elytra less dehiscent at tip, which is more broadly rounded, and scarcely margined; yellow with base, two bands and apex black; bands sometimes interrupted; *vexatrix* Mann. 29. SEXMACULATA.

Legs and antennæ ferruginous, elytra feebly dehiscent, tips more broadly rounded;

Very robust, black, elytral margin from base to middle, and two lateral spots yellow; tip scarcely margined. 30. QUADRATA n. sp.

Less robust, elytra yellow, entire margin black, a discoidal spot near the base, large lateral one near the middle, and transverse one near the tip black; tip distinctly margined. 31. SEXSPILOTA.

*** Prothorax broader than long, campanulate, transversely excavated or depressed along the whole base, sinuate on the sides, tip strongly constricted and tubular; pubescence not golden, elytra rounded and margined at tip; mouth and genæ rather stout;

Elytra testaceous with a large blotch behind the middle, extending to the margin but not the suture, and tip black. 32. MATTHEWSII.

Entirely black, more coarsely punctured. 33. GROSSA n. sp.

e. Prothorax longer than wide, subcampanulate, with a deep transverse impression near the base, hind angles broad, laminate; color black, elytra sometimes testaceous, scarcely narrowed behind; antennæ with the 4th joint very short;

Prothorax coarsely, elytra very coarsely, punctured, truncate, and spinose; antennæ ♀ short, thickened externally. 34. BREVICORNIS n. sp.

Prothorax densely and coarsely punctured, antennæ slender, elytra sharply truncate at tip. 35. NIGRELLA.

Prothorax sparsely punctured, antennæ slender, elytra feebly truncate at tip. 36. CARBONATA.

B. Prothorax more or less triangular or campanulate, widest at base, hind angles not prolonged. (Antennæ with 4½ joints punctured, the remainder sericeous;) LEPTURA restrict. *Serville.*

a. Antennæ annulated with yellow, 11th joint distinctly divided; elytra narrowed from the base, tip truncate and dentate; ♂ with antennæ serrate, and 5th ventral flattened triangularly, emarginate, and bidentate (sculpture usually coarse, prothorax deeply bisinuate at base with a deep transverse impression);

Elytra truncato-emarginate at tip; prothorax more deeply constricted behind; 11th joint of antennæ strongly appendiculate. ♂ antennæ strongly serrate, almost entirely black, *tenuicornis* Hald.; ♀ antennæ feebly serrate, annulate with yellow; α. Elytra coarsely punctured not shining; 1, base of elytra red, *canadensis* Fabr.; 2, elytra entirely red, *erythroptera* Kirby, *cinnamoptera* Hald.; β. Elytra almost cribrate, shining; 1, elytra entirely red, *cribripennis* Lec.; 2, elytra red at the base; 3, elytra entirely black. 37. CANADENSIS.

Black, prothorax and elytra bright red, more densely and finely punctured, antennæ not annulated. 38. COCCINEA n. sp.

Elytra truncate at tip, prothorax feebly constricted behind;

elytra entirely red, antennæ joints 1–5 black, 11th joint feebly appendiculate. ♂ antennæ feebly serrate, abdomen red; ♀ antennæ nearly filiform, abdomen black; *erythroptera* ‖ Germ. 39. RUBRICA.

elytra pale, side margin and tip black. 40. CIRCUMDATA.

b. Elytra narrowed from the base, very dehiscent at tip, which is rounded and indistinctly margined; prothorax feebly constricted at base, antennæ subserrate in ♂ with 11th joint feebly appendiculate;

Antennæ annulate with yellow, elytra very coarsely punctured, more or less testaceous, sometimes entirely black; ♂ with 5th ventral deeply excavated and emarginated. 41. VAGANS.

Antennæ entirely black, elytra less coarsely punctured (testaceous in the specimens examined); ♂ with 5th ventral less excavated and emarginated. 42. DEHISCENS.

c. Antennæ not annulated, 11th joint scarcely appendiculate, elytra slightly narrowed from the base, truncate at tip; prothorax scarcely constricted behind;

* Prothorax densely and coarsely punctured; 5th ventral in ♂ flattened and truncate;

Elytra reddish, testaceous, fuscous towards the tip, which is transversely truncate. 43. SANGUINEA.*

Elytra obliquely truncate at tip; ♂ entirely black, *lugens* Lec; ♀ elytra scarlet, with a subsutural spot before the middle, one near the side at the middle and tip black, *lætifica* Lec. 44. LÆTIFICA.

Elytra testaceous, feebly truncate, apex and subapical band black; pubescence very long. 45. HIRTELLA n. sp.

** Prothorax less densely punctured; 5th ventral ♂ flattened and broadly rounded;

Elytra obliquely truncate and subdentate at tip; black with yellow markings, consisting of a subscutellar spot, and two transverse bands connected at the suture, more or less interrupted. 46. QUADRILLUM.

*** Prothorax coarsely punctured, elytra densely pubescent with golden hair arranged transversely, 5th ventral ♂ scarcely impressed;

Elytra transversely truncate, frequently fuscous at the sides: α. pubescence of elytra longer and denser, *chrysocoma* Kirby; β. pubescence of elytra shorter, *auripilis* Lec. 47. CHRYSOCOMA.

**** Prothorax usually densely and coarsely punctured, transversely impressed and constricted behind, disk more or less channelled; pubescence of elytra short and sparse; 5th ventral of ♂ scarcely impressed;

First joint of middle tarsi as long as the two following; prothorax feebly impressed;

Pubescence of prothorax golden, elytra testaceous, suture and lateral vitta extending to tip black. 48. NIGROLINEATA.

Black, pubescence brown, elytra and legs testaceous, prothorax subangulated on the sides, elytra more coarsely punctured. 49. RUFULA.

First joint of middle tarsi scarcely longer than 2d; (sides of elytra more sinuate);

Elytra testaceous, tip black. 50. PROXIMA.

Entirely black, (more robust in form). 51. ATRATA.

First joint of middle tarsi as long as the two following, prothorax sparsely punctured, more deeply channelled and impressed; (hind angles of head more tumid, and nearly square, elytra elevated at the base);

Fusco testaceous, elytra paler with a medial marginal dark spot, antennæ ♂ very long. 52. BIFORIS.

Black, antennæ ♂ moderate. DOLOROSA.

d. Antennæ not annulated, 11th joint scarcely appendiculate, elytra elevated at the base, elongate, scarcely truncate, feebly narrowed from the base in ♂, not densely but very finely pubescent, yellow with black spots or bands; prothorax bell-shaped, transversely impressed at base, which is more deeply sinuate than usual;

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* Allied to the European *cincta* Fabr.

* Hind angles of head nearly square, genæ rather long; ♂ with 5th ventral impressed, truncate, and emarginate;

Ferruginous, prothorax obtusely angulated on the sides, elytra with 3 bands and apex black, all connected at suture and margin, antennæ very stout. 53. CRASSICORNIS n. sp.

Legs entirely yellow, prothorax tolerably strongly sinuate on the sides; Abdomen usually yellow, sometimes banded with black, rarely almost entirely black, *fascicentris* Lec. 54. CRASSIPES.

Thighs and tips of tibiæ dark, prothorax rather rounded than sinuate on the sides, abdomen black. 55. TIBIALIS.

** Hind angles short, tumid but obtuse, neck less constricted; prothorax less sinuate on the sides, more finely and less densely punctured, pubescence white, long, and fine;

Black, elytra with a basal spot, two bands connected near the suture, and a large spot near the tip, yellow; legs and abdomen ferruginous, tarsi dusky. 56. BEHRENSII n. sp.

*** Hind angles of head very short, rounded; ♂ as above;

Blackish-blue, shining, prothorax feebly rounded on the sides, elytra slightly truncate at tip, with four pale yellow spots on each; base of thighs pale. 57. OCTONOTATA.

e. Antennæ annulated, 11th joint not appendiculate, elytra not elevated at the base, elongate, parallel, truncate at tip; prothorax bell-shaped, constricted strongly at tip, and less strongly at base; hind angles of head obtuse, genæ moderate, front with a deep transverse impression;

Black, with fine sparse yellowish pubescence; head and prothorax finely, very densely punctured, elytra twice as wide as prothorax, punctured, more densely and a little more finely towards the tip; antennæ long and slender (♀), annulate with pale, legs ferruginous or fuscous. 58. PEDALIS.

C. Prothorax constricted before and behind (except in a); hind angles not prolonged; last joint of palpi dilated, triangular, truncate, sometimes obliquely, sometimes transversely; hind angles of head obtuse and rounded, never square; elytra scarcely narrowed behind;

a. Elytra protuberant at base; tip subtruncate, suture with a small spine; prothorax scarcely constricted, more deeply bisinuate at base;

* Head prolonged behind the eyes;

Sparsely punctured, black, shining, elytra with a yellow vitta from base to behind the middle, usually sinuate, sometimes wanting. 59. VITTATA.

** Neck very near to the eyes;

Black, prothorax pubescent with erect hair, densely punctured, with a smooth dorsal vitta. 60. PUBERA.

b. Elytra not protuberant at base, rounded at tip; prothorax very deeply constricted before and behind, sides strongly rounded, and disk very convex; head prolonged behind the eyes;

Black, front legs, base of thighs, and tibiæ more or less yellow; prothorax sometimes red, very finely pubescent, nearly smooth; base punctured, *paupercula* Newm.; *ruficollis* Say; *allecta* Newm. 61. SPHÆRICOLLIS.

Black, front legs, base of thighs, and tibiæ more or less yellow, prothorax sparsely finely punctured, base punctured; elytra more coarsely punctured, with a yellow vitta extending from the base almost to the tip, sometimes interrupted near the tip, *nitidicollis* Horn. 62. VIBEX.

Testaceous, prothorax densely punctured, clothed with yellow pubescence; elytra more coarsely punctured, with a sutural and lateral black vitta, extending nearly to the tip. 63. AURATA.

Piceous or black, prothorax scarcely punctured, feebly pubescent; elytra less coarsely punctured, with three marginal spots and a sinuate black vitta extending from base for three-fourths the length, where it is confluent with the posterior spot; legs testaceous, hind thighs dusky at tip; a. Vitta reduced to a very short basal streak; and marginal spots to faint clouds. 64. SCRIPTA.

c. Elytra not protuberant at base, rounded at tip, prothorax slightly constricted at base and at tip, sides tuberculate, head prolonged behind the eyes; antennæ stout, 3d and 4th joints united equal to 5th;

Testaceous, elytra very coarsely punctured, with a small fuscous spot near the side about the middle. 65. GNATHOIDES n. sp.

D. Prothorax constricted before and behind, hind angles scarcely prolonged, but broadly and feebly lobed; elytra parallel, truncate at tip, and armed with a strong sutural spine; palpi not dilated, penultimate joint of maxillary nearly as long as last joint; hind angles of head short, rounded, genæ moderate, mouth rather short, front with a deep transverse impression; antennæ slender with 4½ joints punctured, remainder sericeous; 11th joint not appendiculate; ♂ with antennæ longer, and 5th ventral broadly and deeply emarginate with angles acute;

Testaceous, finely pubescent, elytra with narrow sutural line, two small clouds near the base, and two about the middle fuscous, (very large species). 66. VALIDA.

E. Prothorax quadrate, slightly narrowed in front, not constricted but only feebly impressed behind, elytra feebly narrowed from the base, slightly truncate at tip; palpi as in B, with the last joint feebly dilated, truncate, and longer than the preceding; head suddenly narrowed behind, but not constricted, very short hind angles, rounded; antennæ with 4½ joints punctured, the remainder sericeous 11th joint of antennæ of ♂ very strongly appendiculate, 7th and following with a smooth feebly carinated line beneath;

a. Elytra punctured;

Black, prothorax distinctly narrowed in front, pubescence short. *a.* Elytra dirty testaceous, *luridipennis* Hald.; 67. MUTABILIS.

Black, prothorax nearly square, pubescence long, erect, fuzzy. 68. QUADRICOLLIS.

b. Elytra rough with elevated points or granules;

Very black, thorax feebly bisinuate on the sides; antennæ not carinated, 11th joint not appendiculate. 69. ASPERA.

F. Prothorax constricted before and behind, wider at base, hind angles not prolonged; elytra wider, parallel, rounded at tip; head suddenly narrowed far behind the eyes, but not constricted, hind angles therefore long, broadly rounded; *eyes not emarginate*, antennæ inserted a little behind the front margin of the eyes, slender, with 4½ joints punctured, the remainder sericeous, 11th joint simple; genæ rather short, palpi with last joint triangular, truncate, as in *L. vittata;* this group differs from Acmaeops chiefly by the position of the antennæ;

Black, antennæ brown, front legs ferruginous, with knees, tip of tibiæ, and tarsi dark; head and prothorax longer than wide, densely and finely punctured, the latter subcanaliculate, with smooth narrow dorsal space. 70. CUBITALIS.

Prothorax not longer than wide, more densely punctured, elytra and legs testaceous. 71. SPURIA.

541. L. gigas. Niger pubescens, prothorace dense subtiliter punctato, dorso utrinque late deplanato, linea dorsali subelevata; elytris læte fulvis, quadrisulcatis, apice nigris, emarginatis, bispinosis. Long. 35 mm.

The specimens commonly called *L. emarginata* from Texas differ from the northern individuals by the prothorax much more densely punctured, the disk more impressed each side, the dorsal line more elevated, the posterior impression less curved, the middle lobe of the base with a distinct transverse elevation near the margin, and finally by the elytra being each marked with four vague wide grooves, reaching neither the base nor the tip, and presenting somewhat the appearance observed in Tragidion.

542. L. soror. Testacea, flavo-pubescens, prothorace toto vel disco solo nigro, postice vage impresso; elytris fascia media alteraque ante apicem nigris, apice acuminatis, occipite pectorisque lateribus nigris; antennis validiusculis fuscis, vix annulatis. Long. 12 mm.

California; Dr. Horn. This is so closely allied to the lighter colored varieties of *L. obliterata*, that it might be viewed as a less developed Southern race of that species. Nevertheless the elytra are less distinctly obliquely truncate at tip, so as to become rather rounded, and acutely acuminate; the antennæ are also stouter in both sexes, and the 4th joint is more distinctly shorter than the 5th. The color varies quite as much as in *L. obliterata*, though I have never seen a specimen of *soror* with the antemedial spot, which is but rarely absent in the former. The prothorax is sometimes entirely black, sometimes with the disk and prosternum black, and all the margins yellow; the head is usually black, with the mouth, and antennal tubercles yellow; the trunk is sometimes entirely black, sometimes black only at the sides; the legs are testaceous, with the tarsi darker, and in one specimen the hind thighs are dusky at tip. The sexual characters are as in *L. obliterata*.

543. L. plagifera. Nigra, breviter pubescens, prothorace haud dense punctato, latitudine vix longiore, antrorsum valde angustato, lateribus ante medium subangulatis, angulis posticis productis, ante basin transversim impresso, et breviter subcanaliculato; elytris haud dense subtilius punctatis, postice dehiscentibus, oblique truncatis et acuminatis, sanguineis, vitta communi lata nigra pone basin ad apicem extensa; abdomine sanguineo, tibiis ferrugineis apice fuscis. Long. 18 mm.

One female. Lake Tahoo, Sierra Nevada; Mr. Edwards. Quite distinct by the characters above given; to be placed next to *L. abdominalis* Hald. The thoracic impression is angulated at the middle and extends to the sides; the pubescence of the prothorax is short and erect, that of the elytra is very short, and at first sight not conspicuous. The genæ are long, and the palpi slender as in the other species of the group.

544. L. rubida. Nigra, pube subtili fulva parce vestita, capite thoraceque confertim subtilius punctatis, illo angulis posticis brevibus rotundatis, genis mediocribus; hoc latitudine longiore, apice angustiore, lateribus late rotundatis, angulis posticis parvis acutis, basi utrinque late concavo; elytris fusco-testaceis, fortiter haud dense punctatis, fere parallelis, apice oblique subtruncatis vix marginatis; pedibus plus minusve ferrugineo-fuscis. Long. 13 mm.

One specimen; California. The pubescence is very fine, and is grayish beneath, though yellowish above. It is easily distinguished from the other species of the group by the larger size and different color. The general form is the same as in *L. subargentata*, etc.

545. L. tribalteata. Nigra, prothorace subtusque dense aureo-pubescens; prothorace campanulato, basi transversim excavato, angulis posticis acutis; elytris punctulatis, dense breviter pubescentibus, læte flavis, fasciis tribus transversis rectis apiceque nigris, apice oblique truncatis; pedibus rufo-testaceis, antennis validis nigris. Long. 10 mm.

One ♂ specimen; Owens' Valley, Dr. Horn. Allied to *L. læta* Lec., and having the antennæ equally thick, but differing from both it and *L. nitens* by the elytral fasciæ narrower and perfectly straight, so that the yellow predominates, while in the species just named the black is the ground color; the bead of the suture and a narrow basal margin are also black.

546. L. quadrata. Robusta nigra, breviter fulvo-pubescens, capite thoraceque confertim punctatis, illo angulis posticis brevibus rectis rotundatis, genis oreque sat prolongatis; hoc lateribus pone medium fere parallelis, antice obliquis, apice fortiter constricto, basi declivi, et utrinque vage concavo, angulis posticis parvis acutis; elytris subparallelis (♀), apice parum dehiscentibus rotundatis et marginatis, subtilius punctatis, macula laterali ad medium alteraque ad dodrantem parvis pallidis; antennis pedibusque ferugineis. Long. 11 mm.

One specimen; Saskatchewan. I would be tempted to place this as one of the varieties of the Protean *L. instabilis*, but the elytra are less dehiscent and more broadly rounded at tip, the antennæ and legs are ferruginous, (always black in *instabilis*), and the pubescence is very short.

547. L. grossa. Crassa, nigra opaca, subtus brevissime cano-pubescens, (supra glabra ?) capite thoraceque dense punctatis, illo angulis posticis tumidis rectis rotundatis, genis oreque mediocribus; prothorace latitudine breviore antrorsum multo angustiore et fortiter marginato, basi transversim depresso, lateribus subsinuatis, angulis posticis acutis, disco utrinque vage foveato, subcanaliculato; elytris sat dense punctatis, fere parallelis, apice rotundatis et marginatis. Long. 18 mm.

One ♀; California, Dr. Horn. Quite different from the neighboring species by the coarser punctuation; the sides of the thorax are subsinuate and less distinctly angulated than in *L. instabilis*, and the mouth and genæ are shorter. In this latter character it resembles *L. Matthewsii*; the form is, however, stouter, the antennæ thicker, and the punctuation much coarser.

Since publishing the description of *L. Matthewsii* I have received from the same collection a male. It differs by less robust form, and very long antennæ, one-fourth longer in fact than the body, and stouter than in the ♀. There is scarcely any ventral difference between the two sexes. The apical blotch of the elytra is wanting, and the post-medial is reduced to a small cloud, almost as in *L. biforis*.

548. L. brevicornis. Nigra, sat robusta, opaca, capite dense, prothorace rude punctato, hoc campanulato, ad basin transversim profunde depresso, angulis posticis laminatis; elytris antice grosse, postice fortiter punctatis, apice oblique truncatis et breviter acuminatis; antennis (♀) brevibus, extrorsum crassioribus, articulis 8—10 crassities haud longioribus. Long. 19 mm.

Virginia City, Nevada; Mr. Edwards. Allied to *L. nigrella* Say, but stouter, much more coarsely punctured, and with quite different antennæ; the 3d joint is two and a half times as long as the 2d, the 4th is two-thirds the length of the 3d; the 5th is fully twice as long as the 3d, the 6th and 7th shorter and wider, 8th, 9th, and 10th, stouter and shorter, almost wider than long, subtriangular, somewhat rounded, 11th larger, oval, rather pointed. The total length barely extends beyond the base of the prothorax.

549. L. coccinea. Nigra, fulvo-pubescens, prothorace elytrisque læte rubris, illo dense punctato, latitudine baseos haud breviore, antrorsum magis angustato et constricto, postice constricto, angulis paulo laminatis, lateribus rotundatis; elytris confertim punctatis, postice paulo angustatis, apice oblique truncatis, spina exteriore longiore; tibiis tarsisque ferrugineis, antennis ♀ haud annulatis. Long. 17 mm.

California; Mr. Ulke. Of the same form as *L. canadensis*, but easily known by the finer punctuation, and differences in color.

550. L. hirtella. Nigra opaca, pubescens, capite postice, prothorace elytrorumque basi longius pilosis, fere lanuginosis, illis confertissime subtiliter punctatis; elytris a basi angustatis, apice subtruncatis, testaceis macula subapicali apiceque nigris; tibiis testaceis apice nigris. Long. 10 mm.

One ♂; Labrador; Dr. A. S. Packard. Easily distinguished by the very long hair of the head, prothorax, and front part of the elytra. The mouth is short, the genæ moderate, the hind angles of the head short, square, rounded; the prothorax a little longer than wide, campanulate, sides parallel behind, rounded in front, constricted at tip, convexly declivous at base, angles not prolonged. Antennæ long, subserrate (last joint ?). Last ventral segment feebly channelled, truncate, and slightly emarginate, with the angles acute, and dentiform.

The 5th ventral in *L. sanguinea* ♂ is truncate, but not dentate, in *L. lætifica* and *quadrillum*, it is feebly impressed, but broadly rounded, as in the ♀.

551. L. crassicornis. Ferrugineus nitidus, elytris parce subtilius punctatis fasciis tribus apiceque nigris, omnibus ad suturam et marginem connexis; prothorace confertim, antice subtilius punctato, apice basique constricto, lateribus antice obliquis, dein obtuse angulatis et fere parallelis, basi fortiter bisinuato; elytris ad basin planiusculis fortiter lobatis, apice rotundatim subtruncatis; antennis validis (♀) corporis dimidio haud longioribus. Long. 15 mm.

California; Mr. Ulke. Allied to *L. crassipes* Lec., but much larger, differing in color, with the antennæ very much stouter and shorter.

552. L. Behrensii. Elongata nigra, subnitida, pube alba tenui longiuscula parce vestita; capite thoraceque subtiliter punctatis, hoc latitudine longiore, antrorsum angustiore, lateribus subsinuatis et late rotundatis, apice basique transversim constrictis, basi profunde bisinuata, angulis posticis subacutis haud prolongatis; elytris parallelis, apice subtruncatis, antice planiusculis haud impressis, haud dense punctatis, macula subscutellari, plaga maxima maculam lateralem includente, maculaque prope apicem flavis, abdomine pedibusque ferrugineis, genubus tarsisque fuscis. Long. 17 mm.

One ♀; Mendocino, California, sent by Mr. Jas. Behrens to Dr. Horn. This species is apparently the western analogue of *L. 8-notata*, but is much larger, and the spots are differently formed and arranged. It gives me much pleasure to dedicate this species to the industrious and intelligent gentleman by whom it was collected, who by his labors has greatly added to our knowledge of the entomological fauna of the Pacific States.

The antennæ are slender, more than half the length of the body, the 4th joint about two-thirds the length of the 5th joint. The spots on the elytra are pale yellow; one near the base, extending obliquely inwards, an oblique fascia running from the margin a little in front of the middle, a second broader fascia behind the middle, connected with the first near the suture, so as to inclose a large subquadrate lateral spot; another large spot near the tip, attaining neither the suture nor margin.

Should the yellow spots be greatly extended, and the black reduced, varieties might occur somewhat resembling some varieties of *L. crassipes*, but would be at once distinguished by the different form of the prothorax, which is less convex, less rounded on the sides and less punctured, by the finer pubescence, and by the elytra being less protuberant at the base, with a less deep intrahumeral impression.

553. L. gnathoides. Testacea, parce subtiliter pubescens, thorace confertim punctato, latitudine sesqui longiore antice posticeque subconstricto, apice angustiore, lateribus sinuatis, antice medium obtuse tuberculatis; elytris parallelis, apice rotundatis, gutta parva sublaterali picea versum medium ornatis, grosse punctatis, punctis postice sensim minoribus; antennis (♂) validis, articulo 4to 3io breviore, 5to illis conjunctis æquali. Long. 9 mm.

One male; Oregon, Mr. Edwards. The head is square behind with rounded angles, the genæ moderately short, and the palpi dilated as in *L. scripta*, and the others of that group (C-b); but it is remarkably different by the antennæ which are stout, with the 3d and 4th joints much shorter, and united only equal to the 5th. The sculpture of the elytra is very coarse, and the general appearance recalls Gnathium of the Meloidæ.

554. L. aspera. Nigra, opaca, capite thoraceque dense punctatis, hoc latitudine longiore, antrorsum sensim angustato, lateribus bisinuato, et vage transversim impresso, dorso late vage canaliculato, et utrinque late foveato; elytris basi thorace plus sesqui latioribus, postice parum angustatis, apice subtruncatis, dorso planis, granulis parvis minus dense asperatis. Long. 9—13 mm.

Vancouver Island; Messrs. Matthews. Entirely similar in form and appearance to *L. mutabilis*, but the thoracic impressions, though broad and shallow, are well defined; the proportion of the antennal joints is about the same, the 3d and 4th united being a little longer than the 5th; the outer joints are, however, not carinated beneath, and the 11th joint is not appendiculate. The antennæ are longer than the body in the ♂, and shorter in the ♀. The body beneath is pruinose, with very short whitish pubescence.

555. L. spuria. Nigra, cinereo-pubescens, capite thoraceque confertim subtiliter punctatis, hoc antice posticeque constricto, convexo, subcanaliculato, lateribus postice parallelis, antice obliquis, angulis posticis subprominulis; elytris parallelis, apice rotundatis, sat fortiter punctatis. Long. 11 mm.

Oregon and Washington Territory; one pair. The antennæ in the male are slender, nearly four-fifths the length of the body; scarcely more than half the length of the body in the ♀.

This and *L. cubitalis* form a peculiar group in the genus, having the eyes scarcely emarginate on the inner margin, and the 3d joint of the tarsi broader and more deeply bilobed than usual, agreeing in these characters with Acmæops; the head is much less constricted behind than in other Lepturæ, although it is suddenly narrowed, and the angles are rectangular and rounded, almost as in Encyclops; the front is, however, not vertical, the transverse impression is deep, the genæ rather short, the epistoma and mouth moderately long; the last joint of the palpi is but feebly dilated, and squarely truncate, longer than the preceding, as usual.

I would associate these species with the 2d division of Acmæops, but the antennæ seem to be inserted rather behind the line joining the front of the eyes, as in other Lepturæ, and the general appearance is more suggestive of the latter genus. They would, however, be equally well placed in either.

MONILEMA SAY.

A. Scape of antennæ feebly punctured, or nearly smooth;

a. Scape of antennæ acute inwards at tip;

Disk of elytra flattened, sides suddenly inflexed; protborax cylindrical. 1. APPRESSUM *Lec.*

Elytra very convex; prothorax with a feeble lateral tubercle or spine, sides subsinuate. 2. ANNULATUM *Say.*

b. Scape of antennæ cylindrical at tip;

α. Body variegated with a network of white pubescence; sides of elytra suddenly inflexed;

Lateral tubercle of prothorax well-developed. 3. ALBOPICTUM *White.*

β. Sides of elytra suddenly inflexed; color uniform black, antennæ alone partly cinereous;

* 3d joint of antennæ annulated;

Lateral spine of prothorax long, acute; disk of elytra flattened; (punctures variable, sometimes very few). 4. GIGAS n. sp.

** 3–7 joints of antennæ annulated;

Prothorax sparsely punctured, lateral spine large, acute, disk of elytra not flattened; 5. FORTE n. sp.

Prothorax sparsely punctured at base and apex, lateral spine small, directed upwards, elytra not flattened. 6. SEMIPUNCTATUM *Lec.*

Prothorax with a few punctures near the base, lateral spine small, directed upwards; disk of elytra not flattened, (punctures variable, sometimes very few). 7. ARMATUM *Lec.*

Prothorax nearly smooth, lateral tubercle very feeble and obtuse; elytra with a few large punctures towards the sides. 8. LÆVICATUM *Bland.*

γ. Elytra wider, sides more convex, lateral tubercle of prothorax small, subacute, horizontal;

Body stouter, uniform black, elytra very convex. 9. CRASSUM *Lec.*

δ. Prothorax strongly, not densely punctured, sides scarcely tuberculate, elytra roughly punctured before the middle, sides suddenly inflexed. 10. OBTUSUM n. sp.

B. Scape of antennæ strongly punctured, cylindrical at tip;

Body more elongate (as in *M. armatum*); prothorax nearly cylindrical without lateral spine. 11. SUBRUGOSUM *Bland.*

556 M. gigas. Nigrum nitidum, prothorace punctis perpaucis notato, lineaque basali majorum, spina laterali elongata acuta; elytris antice grosse punctatis, dorso deplanatis, lateribus subito deflexis; antennis scapo haud mucronato, articulo 3io usque ad medium cinereo-pubescente. Long. 37 mm.

Arizona; Dr. Horn and Mr. Ulke. Easily known by the very large size, the extremely long thoracic spines, and only the 4th joint of the antennæ with a broad, cinereous band. The elytral punctures in one specimen are numerous, in the other very few.

557. M. forte. Nigrum subnitidum, prothorace parce fortiter punctato, punctis postice sat densis, spina laterali acuta; elytris subrugosis, basi præcipue versus latera grosse punctatis et asperatis, dorso convexiusculo, lateribus subito deflexis; antennis scapo haud mucronato, articulis 3—7 basi cinereis, 8—11 totis cinereis. Long. 32 mm.

Arizona; Mr. Ulke, also a very large species, but easily distinguished from the preceding by the prothorax being more punctured, the spines shorter, the antennæ annulate, and the elytra less flattened on the back. It may perhaps be an extremely well developed form of *M. semipunctatum* Lec., but in the absence of a full series of specimens it would be hazardous to unite them.

558. M. obtusum. Nigrum subnitidum, prothorace parce fortiter punctato, lateribus subsinuatis haud spinoso; elytris ante medium asperato-punctatis, dorso modice convexis, lateribus subito inflexis; antennis scapo haud mucronato, articulis 3—7 basi cinereo-pubescentibus. Long. 20 mm.

Utah; Mr. Ulke. Of the same form as *M. appressum* Lec. but with the elytra less flattened on the back, and the scape of the antennæ not mucronate; the cinereous bands of the antennæ are gradually shorter, so that the one on the 7th joint is very small.

MONOHAMMUS Serv.

The species infest pine trees thoughout the whole extent of the United States, and contiguous northern regions. They may, following the arrangement proposed by Lacordaire, be tabulated thus:—

A. Elytra rounded at tip, suture prolonged;

Brown, elytra mottled with quadrate patches of brown and gray pubescence; sutural spine acute; prothorax rather smooth, sparsely punctured, lateral spine larger but less acute than in the next species.
1. TITILLATOR (*Oliv.*).

Smaller, brown, elytra more cylindrical, with some patches of fulvous hair in front of the middle, sutural spine larger and obtuse; prothorax more punctured and rugose, lateral spine more acute. Length 14—18 mm. Georgia.[*]
2. MINOR n. sp.

Dark blackish-brown, with metallic gloss, elytra with gray pubescence, varied with quadrate patches of dark-brown hair, sutural spine obtuse; prothorax strongly punctured and rugose, spines acute densely clothed with whitish pubescence. 3. MACULOSUS *Hald.*

Blackish, with a dull leaden gloss, elytra as in the preceding, but the punctures are stronger, and tend to coalesce into transverse rugæ; prothorax less punctured but more rugose, lateral spines less densely clothed with yellowish-white pubescence. 4. CLAMATOR *Lec.*

B. Elytra rounded at tip, suture not prolonged;

Black with bronzed lustre; scutellum densely clothed with white hair, elytra with a few small spots of white pubescence.
5. SCUTELLATUS (*Say*).

Black with more leaden lustre; scutellum clothed with white hair, but with a denuded medial stripe; elytra with more abundant small patches of white pubescence, punctures more disposed to form transverse rugæ. Length 17—24 mm. Oregon and Washington Territory.
6. OREGONENSIS n. sp.

Gray, clothed with fine rather close gray pubescence, prothorax much less punctured and rugose, elytra with small patches of blackish-brown hair. 7. CONFUSOR *Kirby*.

C. Elytra gradually obliquely narrowed at the tip, suture not spinose;

Brown, elytra beautifully ornamented with large quadrate spots of fulvous cream-colored pubescence, and denuded spots: *M. fautor* Lec.; *acutus* Lac. 8. MARMORATUS (*Rand*).

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[*] I have one specimen labelled Canada, but the locality seems doubtful.

LOPHOPŒUM Bates.

559. L. volitans. Fuscum dense pubescens, pilis volatilibus elongatis villosum, prothorace spina laterali acuta; elytris lateribus subito deflexis, bicarinatis, carina exteriore ad medium postice abbreviata, fusco maculatis, macula elongata selliformi scutelloque pallidioribus. Long. 5—8 mm.

Cape San Lucas; Mr. Xantus. This species seems to agree more nearly with the genus to which I have referred it than with any other of which I can find description. I should refer it to Pogonocherus, since the front coxal cavities are angulated externally nearly as much as in that genus, but the scape of the antennæ is much longer and more slender, as in Leptostylus, and extends to the lateral spine of the prothorax. The antennæ are about one-fourth longer than the body, and clothed on all sides with long hairs, the 3d and 4th joints are nearly equal, the 5th and following diminish rapidly in length. The prosternum is rather narrow between the coxæ, the mesosternum not wide, truncate and subemarginate behind, the middle coxal cavities angulated externally, though not open.

The body is clothed with dense pale brown pubescence, the antennæ are annulated and punctured with darker, the disk of the prothorax is mottled with darker, and the lateral spines are acute; the base, sides, and tip of elytra are dark, with still darker spots, leaving an elongate common spot of pale gray, emarginate in front and at the sides, extending from the humeri for two-thirds the length, limited for one-half its length by a well-defined carina, extending from the humerus, and becoming obsolete near the tip, which is rounded; outside of this carina is a shorter one, also proceeding from the humerus, and abbreviated at the middle. The body beneath is clothed with pale-brown pubescence, and the groove and tubercle of the middle tibiæ are feeble. The flying hairs are very long and numerous.

LEPTOSTYLUS Lec.

The species may be arranged as follows:—

A. Elytra more broadly and regularly rounded at tip; lateral tubercles of prothorax not prominent, broadly rounded. PALMERI n. sp.

B. Elytra more obliquely narrowed behind, obliquely subtruncate, or separately rounded;

Elytra very rough with asperities. ACULIFER *Say*.

Asperities feeble, arranged in rows;
* Elytra flattened on the disk in front;
Elytra with a white fascia behind the middle, lateral tubercle of prothorax very broadly rounded. PLANIDORSUS n. sp.
** Elytra not flattened on the disk; pubescence concealing the punctures;
Elytra less prolonged behind, lateral tubercle of prothorax broadly rounded. BIUSTUS *Lec.*
Elytra more prolonged behind, lateral tubercle of prothorax obtuse but not rounded. ALBIDUS *Lec.*
Elytra less prolonged, lateral tubercle obtuse not rounded, (much smaller). PARVUS n. sp.
*** Elytra not flattened on the disk; pubescence not concealing the punctures;
Elytra obliquely rounded, truncate at tip; not fasciate with white;
Punctures of elytra rather fine, lateral tubercle of prothorax rounded. COLLARIS *Hald.*
Punctures of elytra very coarse;
Larger, lateral tubercle of prothorax obtuse, rounded. PERPLEXUS *Hald.*
Smaller, tubercle of prothorax obtuse, not rounded. COMMIXTUS *Hald.*
Elytra more broadly rounded, truncate at tip, prothorax with very obtuse rounded lateral tubercle and black spots, and elytra with a paler band behind the middle. MACULA *Say.*

560. L. Palmeri. Nigro-piceus, prothorace transverso, pube ochrea variegato, parce grosse punctato, lateribus paulo dilatatis, haud tuberculatis, prope basin transversim constricto et angustato; elytris prothorace plus sesqui latioribus, dorso antice planiusculis, parce grosse punctatis, apice rotundatis, pube brevi ochrea dense vestitis, fascia basali, macula laterali, fascia postica, guttisque pluribus obscuris; antennis cinereo-annulatis. Long. 18—25 mm.

A female from Arizona, collected by Dr. Henry Palmer, kindly given me by Mr. Ulke, in whose collection it bears the name I have adopted; a male sent by Mr. C. V. Riley to Dr. Horn. Conspicuous by its large size; besides the dark spots on the elytra mentioned in the diagnosis, there is also one near the side, about one-fourth from the apex, which is also dark; the band is sinuated, and runs slightly obliquely backwards from the suture. The male is very remarkable for having the 6th joint of the antennæ dilated inwards at the tip.

561. L. planidorsus. Subtiliter dense griseo-pubescens, prothorace dorso subtuberculato, tuberculo laterali obtuso haud rotundato, apice et basi parce punctato; elytris dorso antice deplanatis, carina laterali dis-

tincta, alteraque obliqua usque ad medium extensa, fasciculis solitis parvis nigris, plaga magna laterali ante medium, fasciaque obliqua pone medium nigricantibus; fascia pallide pubescente paulo pone medium ornatis; antennis cinereis, fusco punctatis et annulatis. Long. 9 mm.

Louisiana; this species is sufficiently distinct by the disk of the elytra being flattened in front, limited each side by an oblique well-defined line, exterior to which is the line defining the abrupt declivity of the sides; towards the tip they are regularly rounded, scarcely prolonged, and obliquely truncate at the extreme tip. The small tufts of black hair are well developed; there is a large lateral dark blotch extending from the side to the oblique ridge, behind which is a broad band of paler cinereous, somewhat as in well marked specimens of *L. macula;* behind this pale fascia the pubescence is dark, with an oblique band composed of two blackish spots, and then a subapical dark cloud. Beneath covered with cinereous pubescence, medial band and apex of tibiæ, and tarsi blackish.

562. L. parvus. **Testaceus, pube subtili dense vestitus, prothorace dorso obsolete tuberculato, lateribus obtuse angulatis; elytris apice singulatim rotundatis, parce fortiter punctatis, tuberculis parvis penicillatis parcis ornatis; capite thoraceque obscurioribus, antennis tibiisque piceo-annulatis. Long. 4 mm.**

Two specimens; Western States. A robust little species, very easily recognized; the disk of the elytra is obliquely impressed in front of the middle, and the post-humeral compression is quite distinct.

STERNIDIUS Lec.

This new genus is founded upon the species of Div. C of my arrangement of Liopus, (Journ. Acad. Nat. Sci. Phila., 2d ser. ii, 172). They differ from Leptostylus by the 1st joint of the hind tarsi as long as the two following, and from Liopus by the mesosternum being broad and truncate between the coxæ. The thoracic tubercle varies in position but little, and is about one-fourth to one-third from the base, obtuse, but not rounded; the sides are emarginate behind the tubercle, but straight and oblique in front of it; there are no dorsal tubercles.

A. Elytra without an ascending angular blotch behind the middle; larger species;

Elytra mottled, with lines of tessellated black and white; a white spot near the apex, with a quadrate black spot in front of it. 1. VARIEGATUS *Hald.*

B. Elytra with a common fuscous cloud angulated at the suture;

Elytra scarcely mottled, apex slightly obliquely narrowed and feebly prolonged, angle of fuscous spot acute. 2. ALPHA *Say.*

Elytra more distinctly mottled, apex more obliquely prolonged, angle of fuscous spot acute. 3. CINEREUS *Lec.*

Elytra more distinctly mottled, apex less prolonged, angle of fuscous blotch obtuse, margined before and behind with whitish pubescence. 4. XANTHOXYLI *Shimer.*

C. Elytra without angular blotch behind the middle, smaller species;

Elytra mottled with small black points, an indistinct transverse white band behind the middle. 5. PUNCTATUS *Hald.*

Broader, elytra sparsely mottled with black points, without white band, lateral tubercle more acute. 6. CRASSULUS n. sp.

D. Thoracic spine nearer the base, elytra and prothorax with lines of fulvous and fuscous pubescence. 7. HALDEMANI *Lec.*

L. misellus and rusticus *Lec.*, l. c. seem to be individual variations of *S. alpha.*

563. S. crassulus. Fusco-piceus, pube brevi cinerea dense vestitus prothorace longitudine plus duplo latiore, guttis 3 fuscis signato, spinis lateralibus acutis; elytris punctis parcis nigris triseriatim digestis, nebula laterali, lineaque transversa mox pone medium fuscis, apice rotundatis, haud prolongatis, vix truncatis. Long. 6 mm.

One specimen; Cape San Lucas, Lower California; Mr. Xantus. The antennæ are annulated, a little longer than the body. This species is more robust than the others, resembling a Leptostylus, from which it is immediately distinguished by the acute thoracic spines, and the 1st joint of hind tarsi equal to two following united.

EUTESSUS Lec.

This new genus is established upon a singular species from Lower California, of which only males are known to me. It is elongate in form, resembling in proportion the common *Graphisurus fasciatus*, but the prothoracic lateral spines are very near (about one-fifth of the length from) the base, as in Liopus; in front of the angle of the spines, the sides are straight and converge slightly; the base and apex are rectilinear. The elytra are elongate parallel, somewhat compressed at the sides, obliquely truncate inwards at the tip; they have several rows of distant small asperities (very much as in *Leptostylus aculifer*), and behind the middle several of these combine to form an elevation, which runs transversely from the side, and then bends abruptly backwards, and is curved to the suture. But the most striking characters are found in the antennæ; which are 4 or 5 times as long as the body, very slender, fringed with short fine hair beneath, as in the ♂ of the other genera of the group; with the scape extending to the base of the prothorax, the inner edge acute towards the base, 2d joint very short, 3d reaching to the extremity of the elytra, 4th joint excessively long, nearly or quite three times as long as the 3d, with an apical tuft of stiff bent black hairs on the inner side; the seven following joints united not longer than the 4th joint.

The legs are moderate, thighs very feebly clubbed, middle tibiæ with an oblique groove on the outer side, hind tarsi much shorter than the tibiæ, with the 1st joint as long as the others united.

564. Eu. asper. Niger, dense breviter cinereo-pubescens, haud pilosus, thorace subinæquali, parce punctato, variegato; elytris parce punctatis, granulis nigris, parcis asperatis, vittaque nigra sublaterali a basi ultra medium extensa ornatis. Long. 14 mm.

Cape San Lucas; Mr. Xantus. I have no doubt from the characters above detailed that the ♀ has a long ovipositor.

EUPOGONIUS Lec.

565. Eu. pubescens. Plumbeo-niger, æqualiter tenue cinereo-pubescens, et longe villosus, prothorace confertim punctato, latitudine longiore, spina laterali minuta; elytris latioribus fortiter punctatis, elongatis cylindricis. Long. 6.5 mm.

Ohio; Mr. Ulke. More slender than *Eu. vestitus* (Say) with the pubescence much finer, and altogether uniform and unmottled. Eu. pauper *Lec.* seem to be scarcely different from *vestitus* (Say).

To this genus belongs Amphionycha *subarmata* Lec. (Col. Kansas, 22), which as observed (Pr. Ac. Nat. Sci., Phil. 1861, 354), bears a deceptive resemblance to *A. flammata* Newm., but has the eyes coarsely granulated, and the claws simple and divaricate.

POGONOCHERUS Serv.

The following characters will serve to distinguish our species:

- A. Erect hairs, very long; elytra truncate and bispinose;
  - Crests of elytra strongly marked;
    - Scarcely variegated, crests feebly tufted. 1. CRINITUS n. sp.
    - With a white fascia before the middle of elytra, crests with long tufts of hair. 2. PENICELLATUS *Lec.*
  - Crests of elytra feeble, with a large anterior transverse white band, badly defined in front. 3. OREGONUS *Lec.*
- B. Erect hairs short; elytra with an anterior white blotch;
  - Elytra rounded at tip. 4. SIMPLEX n. sp.
  - Elytra truncate at tip, and subbispinose;
    - Moderate sized, more strongly punctured. 5. MIXTUS *Hald.*
    - Very small, less strongly punctured. 6. PARVULUS *Lec.*
- C. No erect hairs; pubescence uniform;
  - Elytra rounded at tip. 7. SORDIDUS n. sp.

566. P. crinitus. Dense cinereo-pubescens, subvariegatus, pilis pallidis longissimis villosus; prothorace lateribus fortiter armato; elytris cristis solitis valde elevatis, vix penicellatis, apice bispinosis, spina exteriori longiore. Long. 9 mm.

California; Mr. Ulke. Easily recognized by the absence of conspicuous white spots, the stronger armature of the prothorax and elytra, and the longer erect hairs.

567. P. simplex. Nigro-piceus, pube albida variegatus, parce nigropilosus; elytris versus suturam confuse, extrorsum seriatim punctatis, plaga majore obliqua alba ante medium signatis, apice rotundatis, haud truncatis, sutura prominula. Long. 6 mm.

Kansas and California; Resembles closely *P. mixtus*, but the usual ridges of the elytra are scarcely to be traced, and the tip is not truncate.

568. P. sordidus. Piceus pube minus subtili sordida dense vestitus, prothorace haud dense profunde punctato, latitudine vix breviore, spina laterali longa acuta; elytris parallelis apice rotundatis, punctis profundis subseriatim digestis; antennis sub-annulatis, parce ciliatis. Long. 8—13 mm.

Cape San Lucas; Mr. Xantus. This species is quite unlike the others, on account of the absence of long erect hairs; in color and sculpture it bears a singular resemblance to Ataxia, but is of a different form, and the generic and tribal characters are very different. I can find nothing of importance to separate it from Pogonocherus.

The pubescence is uniform dirty yellowish-brown, and rather coarse, intermixed with short suberect gray hairs proceeding from the punctures. The usual ridges of the elytra are entirely wanting. The front coxal cavities are angulated as in the other species. The body beneath is finely punctulate and pubescent, sparsely punctured with fuscous.

The antennæ are one-half longer in ♂, and but little longer than the body in ♀. The largest specimens are all males.

SAPERDA Fabr.

The species in our fauna may be conveniently arranged as follows: —

I. Outer claw of front and middle tarsi ♂ with a large basal tooth or obtuse process;

A. Elytra separately acuminate at tip;

Process of ♂ ungues long; color yellow-brown, with four oblique darker bands. 1. OBLIQUA *Say.*

B. Elytra rounded at tip, with an acute sutural spine;

Cinereous, head and prothorax vittate, elytra spotted with ochreous-yellow pubescence; process of ♂ ungues long; *a.* Ground color brownish-yellow, spots not conspicuous, *adspersa* Lec. 2. CALCARATA.

C. Elytra slightly dehiscent, and separately rounded at tip;

More coarsely punctured, pubescence thin, varied with fulvous spots; process of ♂ ungues moderate. 3. MUTICA *Say.*

Pubescence fine and dense, concealing the punctures, brown, with white stripes or spots;

Under surface white, upper surface with two broad white stripes; process of ♂ ungues long, *bivittata* Say; *a.* With a brown spot upon the white vitta near the base of the elytra. 4. CANDIDA *Fabr.*

Prothorax with two white stripes, elytra each with two large white spots attaining neither margin nor suture, sides of under surface white; process of ♂ ungues very long. 5. CRETATA *Newm.*

Prothorax with two white stripes, elytra with a humeral, two subsutural white spots; sides of under surface white; process of ♂ ungues small. 6. FAYI *Bland.*

D. Elytra more broadly and conjointly rounded at tip;

More densely clothed with uniform yellow-brown pubescence; elytra each with three small denuded spots; process of ♂ ungues moderate. 7. VESTITA *Say.*

Less densely pubescent; ♀ with prothorax, transverse sinuated fascia, and sides of elytra brownish, legs dark; ♂ with thin cinereous pubescence, legs ferruginous; process of ungues, of front feet small, of middle feet large, *fuscipes* Say. 8. DISCOIDEA *Fabr.*

Lateral stripe of prothorax and elytra and three oblique bands of scarlet pubescence; process of ♂ ungues of front feet small, of middle feet larger; *a.* Varies (♂) with the bands narrower, more oblique and sometimes obsolete. 9. TRIDENTATA *Fabr.*

Lateral stripe of prothorax and elytra, and sutural line of scarlet pubescence; process of ♂ ungues broad and short. 10. LATERALIS *Fabr.*

II. Claws simple in both sexes;

Lateral and sutural margin of elytra, prothorax, and head clothed with bright yellow pubescence, head with two, prothorax with six black spots; *trigeminata* Randall. 11. PUNCTICOLLIS *Say.*

Black, coarsely punctured, thinly clothed with fine cinereous pubescence; *a.* Pubescence fulvous, punctures rather coarser; (Cal. Oregon.) 12. MOESTA *Lec.*

Black, densely clothed with cinereous pubescence, less coarsely punctured. 13. CONCOLOR *Lec.*

MECAS Lec.

569. M. marginella. Atra subtiliter pubescens, et breviter villosa, prothoracis lateribus et vitta dorsali, elytrorum margine laterali apicali et suturali pube pallide flava dense vestitis. Long. 7—8 mm.

Western States and Texas. Easily distinguished by the above characters; the thoracic vittæ do not extend upon the head; the elytra are coarsely punctured, and rounded at tip; the inner division of the claws is acute, and a little shorter than the outer one, though more nearly equal than in *M. femoralis.*

STYLOXUS Lec.

Eyes coarsely granulated, very large, scarcely separated on the vertex, deeply emarginate, but not divided, upper lobe moderately wide; front deeply channelled, antennæ about twice as long as the body, slender, 11-jointed, scape shorter than the head, suddenly constricted at base, with the basal angle rectangular prominent, and the apical edge armed at the inner side with a short spine, there is also on the lower side a large well defined apical cicatrix; 2d joint distinct, but with condyle projecting, larger than the joint itself; following joints nearly equal, sparsely ciliate beneath, 11th shorter. Palpi very unequal, maxillary with the last joint oval pointed, labial very small; mandibles short, stout, pointed. Prothorax cylindrical, one-half longer than wide, slightly and obtusely dilated at the middle. Elytra three-fourths as long as the abdomen, punctured with a feeble dorsal elevated line. Front coxæ prominent, cavities confluent, open behind; middle coxæ prominent, hind coxæ nearly contiguous, prominent, thighs gradually clubbed, front tibiæ feebly but distinctly grooved on the inner side, middle tibiæ not tuberculate, hind tarsi with 1st joint longer than the two following united. Ventral segments ♂ cylindrical, equal, 5th truncate, 6th emarginate, with the genital ring prominent.*

570. S. lucanus. Fuscus, cinereo-villosus, prothorace rugose punctato, callo parvo pone medium notato; elytris pubescentibus, punctatis ad dodrantem abdominis extensis, apice rotundatis. Long. 8.5 mm.

One ♂; Cape San Lucas. Mr. Xantus.

DYSPHAGA Lec.

571. D. lævis. Nigra, prothorace villoso, nitido, parce punctato, ad basin breviter impresso et bicalloso; elytris piceis, rugose punctatis, dimidium abdominis æquantibus, apice rotundatis, longe dehiscentibus, sutura late emarginata, pedibus testaceis: ventre flavo, apice obscuro. Long. 7 mm.

Illinois; the only specimen in my collection has the last ventral segment triangularly excavated, and hairy as in *D. ventralis*, which I consider as the ♀ of *D. tenuipes* Hald. It differs by the nearly smooth thorax, and by the elytra rather longer, narrowed and more dehiscent behind the middle.

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* The following species is mentioned by Chevrolat, Ann. Ent. Soc. Fr., 1862, p. 256, as *M. pusilla*, which it replaces in the Antilles.

Methia punctata. Fusco testacea, antennis femoribus elytrisque pallidi, his vitta obliqua a basi ad medium, altera submarginali, apiceque obscuris; prothorace dense punctato, latitudine longiore, lateribus fere rectis, postice transversim impresso, dorso haud calloso. Long. 7—10.

One ♀, San Domingo, Mr. Gabb; Cuba, Dr. Gundlach. Very similar to *M. pusilla*, but the sides of the prothorax are scarcely dilated at the middle, the front transverse impression is wanting, the posterior constriction is less deep, there are no dorsal callosities, and the elytra are comparatively shorter. The color of the head and prothorax is light and dark brown mixed; the elytral vittæ are connected transversely near the base, and about the middle, but frequently disappear, leaving only a humeral cloudy spot. The wings as in all the species of the tribe are very imperfectly folded at tip.

SMITHSONIAN MISCELLANEOUS COLLECTIONS.
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CLASSIFICATION

OF THE

COLEOPTERA

OF

NORTH AMERICA.

PREPARED FOR THE SMITHSONIAN INSTITUTION.

BY

JOHN L. LECONTE, M.D.

PART II.

WASHINGTON:
SMITHSONIAN INSTITUTION.
MAY—JUNE, 1873.

FAM. LXIII.—SPONDYLIDAE.

I would unite under this name all the aberrant Cerambycidæ of Lacordaire, whether classed with the Prionidæ or Cerambycidæ. By Mr. Thomson they have been in part separated as distinct families, under the general name Subcerambycidæ: he has, however, excluded Spondylis from them and retained it with Scaphinus among the Cerambycidæ.

It seems a more natural view to regard them as sub-families (or tribes, as the case may be), having the same relation to each other as the sub-families and tribes of the Cerambycidæ, and representing in the modern fauna the last remnants of the prophetic, synthetic, or undifferentiated* types of a former geological age. They are, therefore, few in number, without very obvious relations with each other, or with the numerous forms of Cerambycidæ, with which they cannot be intercalated, without interrupting the obvious series of relationships.

They may be briefly described as extraordinary forms, differing not only in appearance from other Longicorns, but also by the tarsi being all deprived of the brush of hair beneath; the 3d joint not bilobed, entire or feebly emarginate, the 4th joint frequently well-developed; the antennæ are short, with the scape very short, much constricted at base, inserted at the side of the head near the base of the mandibles, under a more or less developed ridge; 2d joint rather large, though smaller than the 3d. In our two sub-families the poriferous system of the antennæ is contained in deep foveæ, differing in shape according to the genus. The other characters vary, as may be seen by the table in Thomson, Syst. Cerambyc., 312.

Two sub-families exist in our fauna:—

Prothorax margined; labrum connate.	PARANDRIDÆ.
Prothorax not margined; labrum free.	SPONDYLIDÆ.

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* These three appellations will be acceptable according to the metaphysical school to which the reader may belong. I write not to sustain a theory, but merely to present facts in such relation with other facts, as enables them to be most conveniently classified. The result is the same whatever hypothesis be adopted.

Sub-Family I.—PARANDRIDAE.

The body is elongate, parallel, smooth and shining; head broad, eyes transverse, convex, rather coarsely granulated, feebly emarginate; antennæ extending to the base of the prothorax, in front of the eyes, near the base of the mandibles, under distinct lateral ridges, polished, scape short and thick, strongly constricted at base; 2d joint half as long as 3d; 3–10 equal, subquadrate, constricted at base, flattened, with two deep grooves on the under surface, separated by a convex space, but limited on their outer edge by an acute ridge; 11th joint longer, obliquely truncate and pointed, with the same two grooves, and an apical fovea. Mandibles dentate, longer in ♂ than ♀; labrum pointed, connate with the front; mentum very transverse, closing the buccal fissure, bisinuate in front, ligula corneous very transverse, broadly truncato-sinuate in front; palpi short, labials inserted at the sides of the ligula, widely distant; maxillaries not longer, last joint cylindrical; maxillæ with one very slender and small lobe, sparsely ciliate at tip. Prothorax quadrate, margined at the sides; mesonotum punctured, without stridulating plate, not distinctly separated from the scutellum, which is triangular rounded at tip. Elytra parallel, margined, rounded at tip; epipleuræ extending to the sutural tip; wings perfect. Prosternum distinct between the coxæ, which are large, not prominent, transverse, and inclosed behind; middle coxæ oval, cavities widely open externally, mesosternum parallel, truncate or subemarginate at tip; hind coxæ not prominent, transverse, extending to the sides of the abdomen; episterna of metathorax parallel, narrow; ventral segments 5, equal, alike in both sexes, intercoxal process acute. Legs rather short, thighs compressed; tibiæ compressed, outer angle acute, spurs rather strong, tarsi slender, without brush beneath; 4th joint half as large as the 3d, 5th as long as the others united, claws strong, paronychium slender, small, with two terminal setæ.

The species of Parandra live under pine bark, and are not very well defined.

The affinities of this genus with Prionidæ are quite apparent, but those with Lucanidæ are equally obvious, with also some tendency towards Cucujidæ in Passandra, Catogenus, &c.

Sub-Family II.—SPONDYLIDAE.

Body elongate, rather convex and robust, punctured, opaque or nearly so; head large, eyes transverse, not convex, rather finely granulate, feebly emarginate. Antennæ short or extending beyond the base of the prothorax, inserted under slight prominences in front of the eyes, near the base of the mandibles; 1st joint oval, stout, a little longer than the 3d; 2d about half as long as 3d, or (Scaphinus) nearly as long; remaining joints equal, transverse (Scaphinus), or oval (Spondylis), each with two foveæ on the under surface, which in the former are very large and deep, in the latter small and near the apex; 11th joint pointed at tip. Labrum small, separate. Mandibles long, slender, not toothed; palpi long, not dilated, last joint oval, truncate; mentum very transverse, buccal fissures wide, filled by the base of the maxillæ; ligula very large, corneous, concave, emarginate in front, with broadly-rounded lobes; labial palpi distant, situated on the inferior surface, but remote from the sides. Maxillæ with very small slender lobes. Prothorax oval, convex, narrowed behind, not margined; mesonotum polished, sparsely punctured, without stridulating plate, broadly channelled, distinctly separated from the scutellum by a transverse excavation. Elytra parallel, rounded at tip, epipleuræ narrow, not extending to the suture; wings perfect.

Prosternum distinct between the coxæ, which are subconical, somewhat prominent, angulated externally, and inclosed behind; middle coxæ oval, cavities widely open externally, with distinct trochantin, mesosternum triangular, slightly truncate at tip; episterna of metathorax rather wide, narrowed behind, hind coxæ large, extending to the side of the abdomen, prominent in Scaphinus, but not in Spondylis. Ventral segments 5, equal, similar in both sexes, intercoxal process acute.

Legs rather short, much stouter in Scaphinus than in Spondylis; thighs thick compressed; tibiæ compressed, finely serrate, outer angle prolonged into a flange much more developed in Scaphinus; spurs well developed, unequal on the front pair, obtuse and broad on the hind feet. Tarsi short without brush of hairs beneath, though hairy in Spondylis; 3d joint emarginate; 4th small, but distinct; 5th long, with slender rather large claws, and a very small bisetose onychium.

Spondylis upiformis extends from Alaska to Lake Superior. *Scaphinus sphæricollis* is found in pine woods of the Southern States.

A near approach is said to be made by Spondylis to Asemum; but while recognizing the resemblance, it appears to me to be a very remote one, and I rather consider the present form to be that which makes the closest approach to the next family, without, however, actually belonging to it.

FAM. LXIV.—CERAMBYCIDAE.

Mentum variable, in Prionidæ usually very transverse and entirely corneous, in the others trapezoidal, more or less transverse, frequently coriaceous at tip; ligula membranous or coriaceous, sometimes (Prionidæ, a few Cerambycidæ, and Methiini of Lamiidæ) corneous; labial palpi 3-jointed.

Maxillæ with two lobes, clothed at the tip with bristles, the inner one obsolete in Prionidæ.

Mandibles variable in form, sometimes (Mallodon ♂, Dendrobias ♂) very long; usually curved and acute at tip, rarely emarginate, or chisel-shaped (Distenia).

Eyes usually transverse, most frequently deeply emarginate, often divided, in which case the upper lobe is sometimes wanting (Tillomorpha, Spalacopsis); either finely or coarsely granulated.

Antennæ variable in position, either in front of or between the eyes, in the latter case frequently on large frontal elevations; usually long and slender, imbricate in Prionus (pectinate in some foreign genera), subserrate or compressed in a few forms, with sensitive surfaces differing in the subfamilies and tribes; usually 11-jointed, sometimes 12–25-jointed (Prionus), very rarely 10-jointed (Methia, Dysphaga).

Prothorax margined in Prionidæ, not margined in any others in our fauna; coxal cavities and coxæ variable.

Mesosternum short, side pieces most frequently attaining the coxæ; sometimes (certain Cerambycidæ and Lamiidæ) cut off by the apposition of the sternal pieces.

Metasternum moderate, or long, short only in apterous Lamiæ (Dorcadioides), and in some subterranean foreign genera; episterna variable; in many Cerambycidæ with an opening for the duct of a scent gland near the inner hind angle.

Elytra usually covering the abdomen, rarely short; epipleuræ usually distinct, rarely (some Phytœciini) indistinct.

Abdomen with five free ventral segments, the sixth visible in many males, and occasionally in both sexes.

Legs variable, usually slender, thighs frequently strongly clubbed, hind coxæ transverse, frequently inclosed externally by prolongation of epimera of metathorax. Tarsi with joints 1–3 furnished beneath with brushes of hair, sometimes wanting on the 1st and 2d joints of hind tarsi; 3d joint emarginated or bilobed, 4th joint nodiform, small, connate with 5th joint; claws simple, rarely (Phytœciini) appendiculate or cleft, paronychium slender and distinct in Prionidæ, wanting in the others.

A great family, containing an immense number of species, which live in the larval state exclusively on the woody parts of plants. The species are remarkable for large size, beauty of color, or elegance of form, and have been, on these accounts, great favorites with collectors. Nevertheless their classification, and even the definition of the family, present difficulties which have been called insuperable by every systematist who has yet attempted the task.

The species are easily recognized, the chief variations being only those of size, dependent probably on the quantity of food obtained by the larva, or the excellence of its digestive power. At any rate, the differences appear to be individual and not indicative of races. The genera are, on the other hand, extremely indistinct, as at present recognized, for the reason that the species frequently differ not only by the usual specific characters of form, color, sculpture, &c., but by structural peculiarities of considerable moment, sometimes sexual, sometimes asexual. By regarding these peculiarities as of generic value, the number of genera (as in birds) has been vastly and unnecessarily increased, and the system of classification correspondingly diluted, so that the more essential points of resemblance between allied forms are lost sight of, and the arrangement becomes quite artificial. Frequent reference will be made in the following pages to the misplacement of genera by the best authorities; and, also, what tends to greater confusion, to errors of description in several of our genera, which lead to an incorrect appreciation of their relations.

Several characters which have been recently adopted for the differentiation of tribes seem to me to be of but small, or still worse, illusory importance; and among these, the extension outwards of the middle coxæ, so that they attain or not the episterna is one of the most indefinite, and I have, therefore, rejected it as far as possible in the following scheme.

I have, in common with previous investigators, failed thus far to find any distinct difference capable of expression in words between this family and Chrysomelidæ. One familiar with the subject will rarely if ever mistake one for the other. But so far the essential difference between the Tetramera, of which the larvæ feed upon wood, and those feeding upon cellular vegetable tissues has eluded observation. I can merely at present observe that a slight approximation to it seems to be made in the fact, that in the Cerambycidæ there is a tendency in the epimera of the metathorax to extend to the sides of the ventral segments, while in the Chrysomelidæ the 1st ventral is prolonged forwards at the sides to meet the metathorax; thus showing probably a lower, though necessarily more recent, type, which could have existed only since the development of the higher broad-leaved plants.

And in continuation of this same subject, I would refer the difficulties of classification of the Longicorns to the fact, that being exclusively feeders upon woody tissue, and passing a very long period in the larval state, in the interior of trunks or branches of trees, protected against inundations by the buoyancy of their juvenile homes, they have been peculiarly qualified, not only for an early introduction, but prolonged existence; and that we, therefore, have here a more perfect record than is likely to occur in any other land animals. Among marine objects frequent examples occur of the representation in the existing fauna of forms more fully represented in previous geologic periods; but this is the first instance in which we have had occasion to note the probability of its occurrence in the Coleoptera. I have already alluded to this subject,* specially in connection with the Spondylidæ, and have been very glad to find that the idea has been approved of by my friend H. W. Bates†, the distinguished explorer of the Amazon, in words so expressive that I cannot forbear quoting them.

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* An attempt to Classify, &c., Journ. Acad. Nat. Sci. 2d, II. 99, (1851).

† Contributions to an Insect Fauna of the Amazon Valley, Coleoptera, Longicornes, Part I. Lamiaires, p. 5–6 (from Annals and Mag. Nat. Hist. 1861).

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"It is one of those groups of insects in which nature, in striving after strong individuality in the species, seems to have changed or adapted those parts of structure upon which we rely for characters of genera and groups of genera. The family, too, is found throughout all parts of the world where woody vegetation exists, and has endured, probably, under the same laws of modification, throughout long geological periods. The diversity of specific forms seems endless, running into infinite varieties of grotesque, ornamented, and extraordinary shapes; and nearly every species has structural peculiarities for its specific characters; so that in no family can genera be made so easily and numerously as here. Analysis is too easy, and has already been pushed, perhaps, to too great an extent."

This family comprises three sub-families, as follows:—

Prothorax margined; labrum connate.	PRIONIDAE.
Prothorax not margined; labrum free.	
Front tibiæ not grooved.	CERAMBYCIDAE.
Front tibiæ obliquely grooved on the inner side.	LAMIIDAE.

Sub-Family I.—PRIONIDAE.

The insects of this sub-family are generally of large size, containing in fact the longest Coleoptera known; the color is brown or black, and the elytra usually coriaceous in appearance, becoming metallic and of firmer consistence in some of the genera, with finely granulated eyes. The labrum is connate with the epistoma. The ligula is always entirely corneous, without distinct paraglossæ; the supports of the labial palpi are connate with the ligula. The mandibles are strong, frequently elongated in the males, and are destitute of membrane or molar tooth. The lobes of the maxillæ are small, the inner one obsolete, and the last joint of the palpi is triangular. The antennæ are furnished with poriferous spaces, varying according to the genus and tribe. The prothorax is always distinctly margined, the front coxæ are transverse, with distinct trochantin.

The mesonotum never has stridulating surfaces, such as are seen in most other Cerambycidæ; some of the species, however, have the epipleuræ covered with fine transverse lines, and a noise is produced by rubbing the hind femora against the edge of the elytra, a phenomenon of which the first record has been made by Mr. C. V. Riley.*

Our species fall naturally into the following tribes:—

Eyes strongly granulated;	
I. Prothorax pluridentate on the side;	
3d antennal joint very long.	Ergatini.
3d antennal joint moderate.	Mallodontini.
II. Prothorax paucidentate on the sides;	
Metathoracic epimera parallel;	
Antennæ filiform.	Derobrachini.
Antennæ imbricate.	Prionini.
Metathoracic epimera narrowed behind.	Tragosomini.
III. Eyes finely granulated.	Solenopterini.

Tribe I.—ERGATINI.

One species, *Ergates spiculatus* Lec. of large size (55–63 mm. long), is not uncommon on the maritime Pacific slope and in New Mexico. The tribe is easily known by the prothorax being much broader in the male than in the female, and finely punctured; in the latter sex the sculpture is very coarse, and the small teeth of the lateral margin longer and more acute. The head is small, the eyes reniform and coarsely granulated; antennæ 11-jointed, slender, two-thirds the length of the body in the ♂, about half the length of the body in the ♀, rough with elevated punctures, with the 3d joint as long as the three following united; poriferous spaces on the 3d joint small inconspicuous, on the under surface near the distal end, gradually becoming larger, until the outer joints become entirely poriferous, and irregularly reticulated with fine elevated lines forming elongate cells, which are much less distinct, and in fact hardly to be seen in the male.

The generic characters are not sufficiently distinct from the European species *E. faber* to warrant the retention of the genus *Trichocnemis* proposed in my earliest description of this insect.

Tribe II.—MALLODONTINI.

This tribe contains also species of very large size (one from Florida in my collection is 61 mm. long), with the sides of the prothorax armed with numerous small teeth. The head is comparatively large, the eyes strongly granulated, distant, transverse, feebly emarginate; the antennæ are slender, half the length of the body in the ♂, shorter in the ♀, sparsely and coarsely punctured; the 3d joint is scarcely longer than the 4th; poriferous spaces commencing on the under surface at the distal end of the 3d joint, gradually becoming larger until they cover the outer four joints, which are sculptured with fine longitudinal elevated lines.

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* Canadian Entomologist, iv. 139.

The prothorax frequently differs in the two sexes, being nearly quadrate in the ♂, densely punctured with smooth separate facets, narrowed in front in the ♀, more coarsely punctured towards the sides, uneven on the disk.

The species form two groups: 1. Mandibles nearly horizontal, prolonged in the ♂. 2. Apagiognathus *Thom.* mandibles vertical. These characters do not seem to be of generic value.

M. gnatho Lec. from Texas belongs to the 1st group, and is further distinguished by the metathoracic episterna having the inner outline concave; this form is recognized by Lacordaire as a distinct genus, Nothopleurus (l. c. viii, 125), but the difference scarcely merits such separation; in the ♂ the metasternum has two large densely villous spaces, in the ♀ the same portion is clothed with long soft pubescence.

Tribe III.—DEROBRACHINI.

In this tribe the form is somewhat more slender than in the preceding; the head is smaller, the eyes coarsely granulated, very large, transverse, reniform, and approximate, both above and below, somewhat larger in the males than in the females. The mandibles are horizontal, acute, and alike in both sexes. The antennæ are 11-jointed, nearly filiform in the ♀, thicker at the base in the ♂. The sensitive pores commence on the outer half of the 3d joint, and cover the whole surface of the 4th and following joints, arranged in longitudinal grooves, separated by fine elevated lines. The prothorax is alike in both sexes, armed with three acute teeth on each side, the front one of which is in *D. geminatus* double, and occasionally even divided into two large teeth, so that the thorax becomes really 4-dentate. The legs are slender, sparsely punctured with the hind femora deeply sulcate beneath in *Derobrachus brevicollis;* densely punctured, somewhat rough in *D. geminatus;* hind femora less deeply sulcate beneath, and with several short elevated ridges on the inner surface in Orthosoma. In both genera the narrow epipleural portion of the elytra is transversely striate, forming a stridulating organ upon which the ridges or edges of the hind femora grate to produce a sound.

Among our three species I recognize but two genera, Derobrachus and Orthosoma, distinguished sufficiently by the characters above given. *Braderochus* Buquet, to which *D. geminatus* Lec. has been referred, does not seem to me sufficiently distinct. Besides the sexual characters above mentioned, the 5th segment in the ♂ of Derobrachus is broadly emarginate, the 6th visible and also emarginate; and the last dorsal is truncate and emarginate; the 5th ventral is elongate and truncate in the ♀, but the 6th is not visible.

In Orthosoma the 5th ventral is rounded in the ♀, but broadly truncate in the ♂, leaving the 6th visible.

The distribution of the species is as follows:—

Derobrachus brevicollis, Southern States.

D. geminatus from Texas, through Arizona to Lower California.

Orthosoma brunneum Forst. (cylindricum ***Fabr.***), is generally distributed over the Atlantic States.

Tribe IV.—**PRIONINI.**

In this tribe the mandibles are moderate in size, acute, and similar in both sexes. The eyes are coarsely granulated, usually large, transverse, convex, and approximated. The antennæ have from 12–27 joints, varying according to species, the joints are conical and imbricated, much heavier in the ♂ than the ♀, the poriferous system commences on the 3d joint, and covers nearly the whole surface of the 4th and following joints. In Prionus ♂ and ♀ the sensitive surface is reticulate, with fine elevated lines, but in Homæsthesis ♂, the surface is quite uniform. The sides of the prothorax are armed with 3 acute teeth in Prionus, but in *Homæsthesis integra* and *emarginata* the apical and basal teeth are obsolete, so that the sides become unidentate.

P. palparis Say, has the form of Prionus, but the antennæ are as in Homæsthesis.

The narrow epipleural margin is striate transversely, and stridulation is produced by rubbing against this surface the sharp edge of the hind femora, which are flattened and sulcate beneath. The legs are slender, compressed, and punctate.

The sexual characters are obvious in the antennæ, heavy in the ♂, slender in the ♀. In some of the species the abdomen in the last-named sex is enlarged, and the intercoxal process is so broad as to show that the character possesses not even a generic value; the division Prioni subterranei of Lacordaire has therefore no foundation in nature, and its contents should be distributed according to the affinities of the individual genera. The 5th ventral segment in the ♂ is truncate and broadly emarginate, so that the 6th is visible; in the ♀ it is more elongate, gradually narrowed behind and truncate, and the 6th segment is not exposed.

Our genera are but two in number, Prionus, containing several species, occurs in every part of the country; Homæsthesis (*P. integer* Lec., *emarginatus* Say) found in Colorado and New Mexico. *P. innocuus* Lec. is the female of one of these species, probably *emarginatus;* the hind coxæ are very widely separated, and the intercoxal process of the 1st ventral segment is very short and wide.

There is much difference in the soles of the hind tarsi, which sometimes, as in *P. brevicornis*, are as thickly clothed with hair as the other feet and marked with a narrow medial groove; sometimes, as in *P. palparis* and Homæsthesis, flattened or broadly concave and nearly naked; sometimes again, as in *P. fissicornis* and *imbricornis*, the covering of hair is thin, so that the joints appear punctured, with a narrow smooth medial groove.

We see, therefore, in this genus that structural characters assume a merely specific importance, a fact which must be constantly borne in mind in attempting a rational classification of Cerambycidæ.

Tribe V.—TRAGOSOMINI.

This tribe is represented in our fauna by *Tragosoma Harrisii*, which scarcely differs from the North European *T. depsarium;* it occurs from Newfoundland to Vancouver Island, but is not abundant. The body is elongate (30–35 mim. long); the prothorax alike in both sexes, very hairy, and armed on the side with a single acute tooth. The elytra are punctured and finely ribbed.

The poriferous system of the antennæ of the ♀, which are slender nearly filiform, and slightly compressed, commences on the 3d joint, on the under surface, and gradually increases, covering the whole of the joints beyond the 6th, and appears like a fine dense punctuation. The head is small, the eyes large, coarsely granulated. The legs are slender, finely punctured, and hairy. The side pieces of the metathorax are triangular, broad in front, pointed behind. The abdomen is gradually narrowed behind, with the 5th ventral segment truncate; the intercoxal process is acute.

Tribe VI.—POECILOSOMINI.

This tribe contains all Prionidæ with finely granulated eyes, and is represented in our fauna by single species of two genera, belonging to the group Solenopteræ. In the specimens before me, which are females, the poriferous system of the antennæ consists of a few irregular scar-like depressions on the outer joints.

The head is small, much narrower than the prothorax, which is trapezoidal, smooth, and obtusely toothed near the base; very roughly punctured and acutely toothed behind the middle in Elateropsis. In both genera the prosternum is deeply emarginate behind for the reception of the mesosternum, which is also emarginate behind.

Sphenostethus Taslei (serripennis Hald.), occurs in the Middle Atlantic States. *Elateropsis fuliginosus* occurs only in the southern point of Florida, whither it has extended from Cuba.

Sub-Family I.—CERAMBYCIDÆ (genuini).

The only characters I can give to define this sub-family are those already set forth in my first paper on this series of Coleoptera,* viz.: Prothorax not margined, front tibiæ not obliquely sulcate, labrum separate from the front, palpi never acute at tip; to which may be added, antennæ always pubescent, never glabrous with corrugated and extensive sensitive surfaces as in Prionidæ.

Utilizing the improvements suggested by Thomson,† myself.‡

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* An attempt to classify the Longicorn Coleoptera of the part of America north of Mexico. Journ. Acad. Nat. Sci. Phila., 2d i, 311.

† Famille des Cerambycides, par M. James Thomson, Paris, 1860.

‡ Note on Classification of Cerambycidæ, Proc. Acad. Nat. Sci. Phila., 1862.

Schiödte,* and Lacordaire.† I have constructed the following table as exhibiting the more obvious relations between the tribes represented in our fauna. The cross relationships can of course only be indicated in the more detailed descriptions which follow, and I am far from believing that the arrangement here adopted can be extended to the immense number of genera found in other countries, with any better success than the two classifications previously devised by me.

The tribes of the Cerambycidæ genuini may be arranged as follows: the series are indicated very plainly, but can hardly be definitely restricted; the tribes seem to be limited tolerably sharply, though the cross affinities are frequently perplexing when an attempt is made at a linear arrangement.

I. Base of antennæ not enveloped by the eyes; antennæ with the 2d joint rather large, front coxæ transverse, not prominent. CALLIDIOIDES.
    Ligula corneous, eyes variable. I. Asemini.
    Ligula membranous, eyes finely granulated. II. Callidiini.
II. Base of antennæ partly enveloped by the eyes; front coxæ not conical, though sometimes prominent; stridulating plate (absent only in Molorchus) large, never divided; ligula membranous (except in the group Oemes); 2d joint of antennæ small (except in one genus of Clytini). CERAMBYCOIDES.
    Eyes coarsely granulated, front coxal cavities open behind (except in Compsa). III. Cerambycini.
    Eyes variable, front coxal cavities angulated, closed behind. IV. Obriini.
    Eyes finely granulated;
        a. Scutellum rounded, tibial spurs small; elytra not sinuate;
    Legs long slender, thighs pedunculated and suddenly clavate; front coxal cavities open behind;
        Antennæ with poriferous system. V. Ancylocerini.
        Antennæ without poriferous system. VI. Rhopalophorini.
    Legs slender, thighs not pedunculated, nor clavate, front coxal cavities open behind;
        Front coxæ rounded. VII. Pteroplatini.
        Front coxæ transverse, cavities angulated. VIII. Rosaliini.

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* On the Classification of Cerambyces, with particular regard to the Danish fauna, by Prof. J. C. Schiödte, Naturhist. Tidschrift, 3d, ii, 483, (1864); translated in Annals and Mag. of Nat. Hist., 1865.

† Genera des Coléoptères, Vol. viii, Paris, 1869.

b. Scutellum acutely triangular; elytra not sinuate;

Front coxal cavities closed behind. IX. Callichromini.

Front coxal cavities open. X. Trachyderini.

c. Scutellum rounded, or broadly triangular (Cyllene); tibial spurs large; thorax never tuberculated, nor spinose; elytra not sinuate;

Tibiæ carinated. XI. Stenosphenini.

Tibiæ not carinated. XII. Clytini.

d. Scutellum broadly rounded; thorax not tuberculate nor spinose; sides of elytra deeply sinuate near the humeri. XIII. Agallissini.

III. Base of antennæ partly enveloped by the eyes, which are nearly divided, and moderately finely granulated; 2d joint of antennæ longer than usual; front coxæ globose, widely separated; stridulating plate of mesonotum divided by a smooth furrow. (Body resembling a Lamiide.) ATIMIOIDES.

XIV. Atimiini.

IV. Base of antennæ not enveloped by the eyes, which are entire or emarginate, and usually finely granulated; front coxæ conical except in Disteniini); stridulating plate of mesonotum divided by a smooth space or furrow. LEPTUROIDES.

A. Mandibles scalpriform, not fringed. XV. Disteniini.

B. Mandibles simple, not fringed. XVI. Desmocerini.

C. Mandibles acute, fringed on the inner margin.

Elytra abbreviated. XVII. Necydalini.

Elytra not abbreviated;

Front nearly vertical. XVIII. Encyclopini.

Front oblique or horizontal. XIX. Lepturini.

Tribe I.—ASEMINI.

This series contains the genera in which the ligula is corneous, with the supports of the labial palpi fixed and connate, not retractile; the eyes are usually coarsely granulated, but sometimes (Asemum, Tetropium, and Opsimus) the granulation is very fine; the antennæ are sometimes short, sometimes long, densely punctured and pubescent, and do not usually have any well-defined sensitive spaces, the 2d joint is always half as long as the 3d, and the 11th is simple; the front coxæ are generally transverse and angulated externally, with distinct trochantin, and the cavities are always open behind; the middle coxal cavities open externally; the side pieces of the mesosternum do not intervene between the sterna; the mesosternum is bent down behind but not acutely emarginate for the reception of the intercoxal process; the episterna of the metathorax are narrowed and almost pointed behind, and the epimera are not longer than the episterna.

In the ♂ the 5th ventral segment is transverse, and the 6th is visible, in the ♀ the 5th is prolonged, and 6th not visible.

The scutellum is always rounded behind; the mesonotum is punctured at the sides, the stridulating plate is wanting in Tetropium; feebly developed, and divided by a broad median vitta in Criocephalus; tolerably large and channelled in Asemum and Nothorhina; large and undivided, as in most Cerambycini, in Opsimus, and Smodicum.

An undifferentiated, or synthetic tribe, having affinities in various directions; the maxillary lobes are very feebly developed, and almost atrophied in Asemum, showing an affinity with Spondylis and Prionidæ; the divided stridulating plate indicates a relation with Lepturini; Tetropium diverges towards Callidium, Criocephalus with its coarsely granulated eyes tends towards the genuine Cerambycini, while Opsimus and Smodicum seem to be entirely isolated, having no relation with other members of our fauna.

The groups may be thus separated.

Epimera of mesothorax normal, truncate at inner end;
  Base of prothorax normal. ASEMI.
  Base of prothorax emarginate, filled by a thin plate. OPSIMI.
Epimera of mesothorax acutely pointed internally. SMODICI.

Group I.—**Asemi.**

The insects of this group are generally Callidioid in form, the head short, the mandibles small, stout, and acute, the palpi nearly equal, or rarely unequal (Tetropium); the eyes finely or moderately coarsely (Criocephalus) granulated, transverse, scarcely emarginate (Asemum), large, more or less emarginate (Criocephalus), divided (Tetropium).

All the genera except Cyamophthalmus, which has the last joint of the palpi subulate, are represented in our fauna, and are distributed on both sides of the continent.

Eyes moderate, transverse, finely granulated, hairy;
  Antennæ finely pubescent. ASEMUM.
  Antennæ coarsely pubescent. NOTHORHINA.

Eyes large, coarsely granulated, not hairy.	CRIOCEPHALUS.
Eyes divided, rather finely granulated.	TETROPIUM.

To Nothorhina belongs *Asemum asperum* Lec., from Oregon and Vancouver. From Asemum must be excluded *A. australe* Lec., which is an anomalous Criocephalus, differing from all the others by the eyes being deeply emarginate.

Group II.—Opsimi.

Opsimus quadrilineatus Mann., from Alaska and Oregon, constitutes this group; it is a lead-colored, finely pubescent insect, having the prothorax armed with a lateral acute spine, and the disk of the elytra with several vague impressions. The antennæ are punctured and coarsely pubescent, as long as the body; the head is short and perpendicular in front; the eyes narrow, emarginate so deeply as to be completely divided, not finely granulated; the palpi are unequal, the labial short, the maxillary elongate, last joint triangular, obliquely rounded at tip; the front coxæ are large, globose, and contiguous, scarcely angulated externally, the lateral fissure being only narrowly open; the middle coxal cavities are angulated externally, but the sternal pieces come in contact so as to cut off the episterna; the episterna of the metathorax are wide in front, narrowed and pointed behind; the legs are stout, the thighs strongly clavate, the spurs small, and the 1st joint of hind tarsi longer than the two following united.

The singular character which distinguishes this from all other groups is, that the thickened hind margin of the prothorax is broadly emarginate in the arc of a circle, and the emargination filled with a thin corneous plate. The mesonotum is punctured each side, with a very broad and flat, extremely fine, stridulating surface.

Group III.—Smodici.

Smodicum cucujiforme (Say), a small narrow depressed pale-yellow species, found under bark in the Atlantic States, constitutes by itself a distinct group, characterised by the mesothoracic epimera being narrowed and acutely pointed inwards; the middle coxal cavities are widely open externally.

The front is broad, short, and perpendicular, the eyes coarsely granulated, very deeply emarginated; the mandibles small, pyramidal, and entire, the genæ very short; the palpi are short, equal, not dilated; the mentum is narrowed and rounded in front, and the ligula appears to be of a coriaceous consistence, with the supports of the labial palpi less distant than usual and connate. The antennæ are polished, very sparsely punctured and pilose, and have two obscurely defined sensitive spots near the extremity of the 5th and following joints; they are scarcely as long as the body in the ♂, shorter and more slender in the ♀.

On the under surface of the prothorax is seen on each side a large reniform impression, which is opaque, coarsely punctured and slightly hairy, and which according to Lacordaire is wanting in some exotic species; the front coxal cavities are small, quadrate, not angulated externally, widely open behind; the prosternum is rather broad. The mesosternum is broad, flat, and truncate behind; the ventral segments 1–4 diminish gradually in length, the 5th is very short, and broadly subemarginate in ♂, narrower and elongate in ♀.

The genus Smodicum seems more allied to Asemum, than to Atimia, with which it has been associated by Lacordaire.* The eyes are coarsely granulated in Smodicum, and very finely in Atimia; the front coxal cavities open in the former, and closed in the latter. The one is an undifferentiated form of typical Cerambycidæ, the other an anomalous form leading to some of the Lamiide groups.

Tribe II.—CALLIDIINI.

A tribe containing species usually depressed, and rarely slender in form; the prothorax and elytra are never spinose. The eyes are finely granulated, deeply emarginate, but do not embrace the base of the antennæ; the head rather small, with the front short, perpendicular, or nearly so; mandibles short, stout, acute, genæ moderately long; palpi usually very unequal, dilated. Antennæ with the outer joints sericeous, or punctured, without distinct poriferous spaces; the 2d joint not as large as in Asemini, but longer than usual. Front coxal cavities transverse, very strongly angulated, with large trochantin, open behind; prosternum variable; middle coxal cavities open externally; mesosternum some-

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* Gen. Col. ix, 143.

times wide and emarginate behind, sometimes triangular and pointed, side pieces large; metasternum with side pieces wider than usual. Legs moderate in length, thighs generally strongly clubbed, 1st joint of hind tarsi at least twice as long as the 2d. Abdomen with ventral segments slightly diminishing in length, 5th, in ♂, short subemarginate.

The antennæ, in ♂, are usually longer than the body, and thicker at base than in ♀. Flying hairs are seen on the legs and antennæ, and frequently on the body.

As in the Stenopteri, there are mute and sonant genera, and according to the sculpture of the mesonotum they may be arranged as follows:—

- A. Mesonotum with a large, undivided, very finely striate stridulating surface.
    - Hind coxæ not prominent, thighs slender. Gonocallus.
    - Hind coxæ very prominent, thighs strongly clubbed; metasternum with scent pores;
        - Elytra with ivory lines. Physocnemum.
        - Elytra uniform. Rhopalopus.
    - Hind coxæ not prominent; metasternum without scent pores;
        - Prosternum broad or moderate, hind coxæ inclosed by side pieces and 1st ventral segment. Hylotrupes.
        - Prosternum very narrow, pointed, hind coxæ not inclosed; prothorax rounded. Phymatodes.
- B. Mesonotum polished, with large scattered punctures;
    - Mesosternum broad, emarginate. Merium.
    - Mesosternum obtusely triangular. Callidium.
- C. Mesonotum punctured and pubescent at the sides, with a medial stridulating surface. Xylocrius.

Gonocallus is established on *C. collare* Kirby (lepidum *Lec.*), a very anomalous species with slender thighs, and the ♂ antennæ 12-jointed. It is an annectant branch towards Stenosphenus and Clytus.

Semanotus does not appear in the above scheme, as the former representative of the genus in our fauna, *C. ligneum* Fabr., appears to me more naturally placed as a section of Hylotrupes, differing merely by the sternal pieces being less dilated.

I have retained Merium *Kirby*, because the type *M. Proteus*, though agreeing with Callidium in the sculpture of the mesonotum, differs essentially in the form of the mesosternum; the sculpture is also different, there being indications, more or less distinct, of two ivory vittæ on each elytron.

Curious sexual differences appear on the under surfaces of the prothorax in Phymatodes and Callidium; the punctures are coarser and more numerous in ♂.

Xylocrius *Lec.* is founded upon *Callidium Agassizii* Lec. (Proc. Acad. Nat. Sci., 1861, 357), a black coarsely punctured species, from California; it is of more convex form than usual in this group, the antennæ are shorter and stouter with joints 3–5 equal, the palpi unequal, the prosternum narrow and pointed behind, the mesosternum subtriangular, obtusely truncated and slightly emarginate at tip, the hind coxæ not inclosed by the side pieces of metasternum. The scutellum is triangular with curved sides, and the mesonotum, though provided with a medial stridulating surface, is punctured and pubescent at the sides. The hind tarsi are stouter than in the other genera of this group, and the thighs are moderately clubbed.

Tribe III.—**CERAMBYCINI.**

A very extensive series, of rather difficult definition, and containing a large number of genera, which seem to have been unnecessarily multiplied, on account of the unimportance of the characters used for the definition of the separate groups. As here restricted, the tribe contains all of the groups of Section A. (Lac. Gen. Col. viii, p. 202), which are represented in our fauna, except Asemini and Obriini; in other words, all genera having the eyes strongly granulated, the front coxal cavities usually open, the abdomen normal in both sexes, and the antennæ with the 2d joint small.

The ligula is sometimes (Oeme, etc.) corneous, but usually membranous, and deeply bilobed; the scutellum is usually rounded, rarely (Chion) triangular and acute; the stridulating surface is fine, and covers nearly the whole mesonotum; the antennæ are nearly always long, and without distinct sensitive spaces. The mandibles are acute at tip. The middle coxal cavities are sometimes open, sometimes closed, varying frequently, to an appreciable extent, in the species of the same genus. The elytra, as observed by Lacordaire, are not abbreviated, but they are slightly so in *Gracilia manca;* the eyes are not divided in any of our genera, though always deeply emarginated, and embracing the antennal tubercles.

Group I.—**Oemes.**

The ligula is more or less corneous, and usually only emarginate at tip; though in Achryson, corneous, with the front part membranous, and broadly bilobed; the body is slender and elongate, the palpi frequently very unequal, the antennæ usually long, and longer than the body in ♂; the eyes are usually very large, convex, coarsely granulated, and very deeply emarginated. The thighs are rather slender, except in Gracilia, where they are strongly clavate.

Three sub-groups are indicated,

Epimera of mesothorax large;	
Front trochantins very distinct.	OEMES.
Front trochantins not visible.	ACHRYSONES.
Epimera of mesothorax small.	GRACILIÆ.

Sub-Group 1.—OEMES.

Oeme rigida (Say), from the Middle and Southern States, and two new genera, Ganimus, and Eucrossus from Arizona, represent this sub-group in our fauna; they are pale brown, slender insects, with the antennæ hairy beneath; rough with small acute tubercles on the under surface of the 3d, 4th, and 5th joints in Oeme; these joints in Eucrossus are not rough, but are armed on the inner side with a terminal spine; the prosternum is very narrow and prolonged in Oeme; moderate in width in Eucrossus: the mesosternum is narrow in Oeme and Ganimus, wider and truncate in Eucrossus; the palpi are dilated in the latter two, but scarcely so in the former, very unequal in all.* The prothorax is strongly constricted at base in Oeme, but in Ganimus is transverse, more rounded on the sides, and not constricted at base.

The sculpture of the prothorax of the ♂ in Eucrossus is peculiar; finely alutaceous, opaque, with a smooth dorsal vitta, and a large scar-like mark each side, nearly parallel with the dorsal line, commencing near the base, suddenly inflexed just in front of the middle, and then abbreviated.

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* Lacordaire, l. c. viii, 222, says that the palpi are subequal in Oeme, but his specimen seems to have been much mutilated.

The episterna of the metathorax in Oeme and Eucrossus are triangular, wide in front, and pointed behind, as in Criocephalus.

The species *E. villicornis* is 18 mm. long, of a pale-brown color; with the elytra feebly punctured, clothed with erect pubescence, marked with two very faint lines, and armed with a small subsutural spine at tip; the joints of the antennæ from the 3d are clothed beneath with a dense fringe of hair, becoming thinner to the 8th, where it disappears.*

The essential characters of this sub-group are in the front coxæ being prominent, very strongly angulated externally, with large trochantin; the middle and hind coxæ are also prominent; the 5th ventral of the ♂ is as large as the 4th and emarginate at tip in Oeme; equally large and truncate in Ganimus; small and truncate in Eucrossus.

The genera may be distinguished as follows :—

Palpi very unequal, dilated;	
Prosternum laminiform; antennæ rough with elevated points; mesosternum very narrow;	
Prothorax lobed at base.	GANIMUS.
Prothorax constricted at base.	OEME.
Prosternum not laminiform; antennæ very hairy beneath, joints 3–6 with a terminal spine;	
Body uniformly pubescent.	EUCROSSUS.
Body with transverse bands of yellow pubescence.	DRYOBIUS.
Palpi short, equal, slender:	
Front coxæ contiguous, hardly prominent; middle coxæ distant.	HAPLIDUS.

The position of Dryobius is doubtful; the eyes are almost finely granulated, and the front coxal cavities much less angulated externally, but the affinities seem to be stronger than with any other group. The type and only species is *Callidium sexfasciatum* Say, a rare insect of the Mississippi valley.

Haplidus is founded upon *H. testaceus* Lec., a slender finely pubescent brown insect, without any striking characters; it occurs in California and Utah, and the affinities of it seem to me also doubtful.

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* *Ganimus vittatus* resembles in form Oeme, and the antennæ are almost equally rough; but the prothorax is not constricted behind, and has a broad basal lobe as described in the African genus Hypæschrus, with which it further agrees in having the middle coxæ very large and nearly contiguous, but differs by the palpi being very unequal.

Sub-Group 2.—ACHRYSONES.

Slender sub-cylindrical species, with slightly dilated palpi; the head short, and front perpendicular as in Oemes; the front coxæ globose, prominent (contiguous in Achryson), not angulated externally, trochantin not visible; the middle coxæ are also prominent, closed externally, the mesosternum is moderately wide, truncate at tip in *A. surinamum*, narrow and sub-triangular in the Texan *A. concolor;* the elytra are armed with a terminal spine in the former, but are rounded in the latter. The 5th ventral segment of ♂ is truncate, but not shorter than the 4th.

A. surinamum (Linn.), (*S. circumflexus* Fabr.) is found from the Middle States to Mexico and South America; it is a slender pale-brown insect, with dark angulated lines on the elytra.

Sub-Group 3.—GRACILIÆ.

Very small slender species of piceous color, very finely punctured and pubescent, constitute this sub-group. The head is short, as in the other sub-groups, the palpi very unequal, the labial short, the maxillary long with the last joint triangular, obliquely truncate so as to appear pointed; eyes large, coarsely granulated, deeply emarginate, almost divided; front coxæ very prominent, nearly contiguous, the prosternum being narrow, and pointed behind; the coxal cavities are sub-quadrate; the middle coxæ are prominent, separated by the triangular mesosternum, the cavities are angulated externally, but the epimera are very small, and do not fully reach the coxæ; the episterna of the metathorax are linear; the 1st ventral segment is somewhat longer than usual. The legs are short, the thighs thick and clavate, the 1st joint of the hind tarsi longer than the 2d and 3d.

The mesonotum is covered with stridulating surface; it is less transverse than usual, nearly quadrate, and finely margined at the sides.

The antennæ are hairy, in ♂ longer, in ♀ shorter than the body. *Gracilia pygmæa* has been introduced in articles of commerce from Europe. *G. manca* is very rare in the Middle States, and differs by the prothorax being more rounded on the sides, and the elytra a little shorter than the abdomen.

Group II.—**Cerambyci.**

This group contains a large number of genera, which have been partitioned by Lacordaire into several minor groups, separated by evanescent or variable characters. Although the typical genera of these smaller groups possess in every instance a distinct appearance by which they may be recognized, yet the structural variations observed even within the limits of the genera themselves, when the species are numerous, are such as to completely prevent any definition of these minor divisions. For the information of the general student, I will mention below the groups of Lacordaire to which he has referred, or would refer the genera represented in our fauna.

I have placed in this group all those genera with coarsely granulated eyes, having the ligula entirely membranous and deeply bilobed, and the middle coxæ more or less angulated externally, even when the two sternal plates come into contact. The other characters are all variable to a greater or less degree, as will be seen by the following table. The metathoracic episterna have in many species a distinct aperture near the hind coxa, at the side of the metasternum, which is the orifice of the scent gland, but even in species of the same genus (Elaphidion) they vary greatly in size, so as almost, or even completely, to disappear. In the same manner the spines of the antennæ, of the femora, and of the elytra have rather specific than generic value. In Ehuria there is a gradual transition from those species in which the lateral spines of the prothorax are acute and prominent to those in which they are entirely wanting.

Antennæ 11-jointed, with recurved hooks on joints 3—6, (prothorax plicate, armed, elytra bispinose). HAMMATICHERUS.
Antennæ 12-jointed, sericeous, serrate. AXESTINUS.
Antennæ 11-jointed;
  A. Front coxal cavities angulated; antennæ, thighs, and elytra not spinose;
    Frontal suture deep; metathorax without scent pores;
Prothorax uneven, tuberculate at the sides. BROTHYLUS.
Prothorax even, (palpi equal). STROMATIUM.
    Frontal suture faint, scent pores distinct;
Elongate, prothorax even, antennæ very long. OSMIOUS.
  B. Front coxal cavities rounded, or feebly angulated;
    a. Scutellum acute, triangular, frontal suture very deep; antennæ very long, sulcate;

Prothorax with lateral spine, but no dorsal callosities, elytra and thighs spinose at tip; episterna of metathorax wider in front, scent pores distinct. Chion.

b. Scutellum rounded behind;

* Femora not strongly clubbed; antennæ not carinated;

Elytra with ivory spots, prothorax with dorsal callosities, and usually with lateral spines; elytra and thighs either spinose or unarmed; scent pores distinct; antennæ unarmed. Eburia.

Elytra without ivory spots, antennæ usually spinose;

Episterna of metathorax narrower behind, antennæ with sensitive spaces. Romaleum.

Episterna of metathorax parallel; antennæ without sensitive spaces. Elaphidion.

** Antennæ carinated, femora not strongly clubbed;

Antennæ slender. Aneflus.

Antennæ stout, joints excavated beneath. Eustroma.

*** Femora strongly clubbed.

Antennæ bisulcate. Tylonotus.

Antennæ not sulcate. Zamodes.

Hammaticherus is represented by *H. mexicanus* Thomson, which occurs in Lower California.

Axestinus is allied to Xestia, but is clothed with fine gray pubescence; the species *A. obscurus* is of large size (30 mill.), and occurs in New Mexico.

To Stromatium I would refer *Anoplium pubescens* Hald., it belongs to the division of the genus without pubescent spaces on the prothorax of the ♂; the disk is, however, more finely punctured in that sex than in the ♀, just as in Romaleum.

Osmidus contains an elongate species from Lower California, resembling in appearance Hesperophanes, and like many of the species of that genus, finely and densely pubescent, with round denuded slightly elevated spots on the elytra; the absence of the deep frontal suture seen in the neighboring genera is a remarkable character.

Romaleum *White* has distinct sensitive spaces on the antennæ, especially well marked in the ♀, commencing in a small depression on the outer face of the 4th joint. It contains all of our large species of Elaphidion, except *protensum*, which has carinated antennæ and tibiæ, and belongs to the genus Aneflus. The typical species of Romaleum is *Enaphalodes simplicicollis* Hald. (Elaph. pulverulentum *Hald.*, nec *De Geer*). It corresponds with Hypermallus *Lac.* in part, but I have replaced the greater number of the species mentioned by him in Elaphidion, as the differences in the sternum, upon which the genera were separated, seem to me to be of purely specific importance.

I have been disposed to retain Anoplium for the second species of Haldeman, *A. unicolor*, which has been fully described by Lacordaire; the first species being placed in Stromatium, the name is thus rendered disposable. But it seems to be so slightly different from Elaphidion, that it is more prudent to suppress it.

Aneflus contains *E. protensum* with the elytra bispinose, and *E. tenue, lineare*, etc , with the spines much shorter, or wanting.

Eustroma is founded upon *Elaph. validum* Lec., a large, stout species from Texas and Lower California, with short and stout antennæ, the intermediate joints of which are concave beneath; the antennal spines are short, and the femora and elytra are unarmed; the 4th joint of the antennæ is conspicuously shorter than the 3d or 5th; the sides of the prothorax have a large oval patch of dense yellowish pubescence in two specimens from Texas, but in another specimen it is much less distinct, and in one, from Lower California, it is not visible.

Zamodes contains a black species from Pennsylvania, of the same size and form as Tylonotus, but without callosities on the prothorax; the antennæ, legs, and general surface of the body are clothed with long, erect, flying hairs. From its strong resemblance in appearance to Zamium *Pascoe*, which is placed by Lacordaire in his group Saphanides, I have derived the generic name.

Group III.—**Ibidiones.**

The very elongate form, large and coarsely granulated eyes, and clavate thighs will easily distinguish the members of this group from all others in our fauna; in addition, it will be observed, that the front coxæ are small, rounded, and either inclosed, or a little open behind, the middle coxæ are not open externally and the cavities not at all angulated; the hind tarsi are slender, the 1st joint as long as the two following united. The front is small and perpendicular, the mandibles short, acute, the palpi somewhat unequal, short, dilated.

The antennæ are elongate, slender in the ♀, thickened at the base in ♂; sparsely punctured, and pubescent, not sericeous. The episterna of the metathorax are narrow, parallel, and have very distinct scent pores near the hind end. Tibiæ not carinate in our species.

This group evidently belongs to the same series as the preceding, with which it connects closely, though assuming a form which is characteristic. The prothorax is very elongate and cylindrical, as in certain Elaphidion, but the antennæ are never spinose.

The two genera belonging to our fauna may be thus distinguished:—

Front coxal cavities closed behind.	COMPSA.
Front coxal cavities open behind.	HETERACHTHES.

Of Compsa, two species are found in Lower California; the genus is easily distinguished by the character given above, and by the joints 3–6 of the antennæ being distinctly carinated; one of the species *C. puncticollis* Lec., is remarkable for the dull color, and coarsely punctured prothorax.

Group IV.—**Curii.**

The singular characters of the two species of Curius *Newm.*, compel me to separate them as a distinct group, which is easily recognized by the coarsely granulate eyes, and very strongly clavate thighs, armed beneath with a broad tooth. The form is elongate, in the typical species depressed, dull, and slightly pubescent; in *C. scambus* cylindrical, polished, and glabrous, resembling Ibidion. The front is small, declivous, the antennal tubercles not prominent, the palpi somewhat unequal, the mandibles small and acute; the antennæ are slender, longer than the body, annulated, finely punctulate and pubescent. The front coxæ are globose, prominent, nearly contiguous in *C. dentatus*, separated in *C. scambus*, and the cavities are open behind; the middle coxæ are entirely inclosed by the sterna, and the side pieces of the mesothorax are *undivided;** the first joint of the abdomen is as long as the two following in *C. dentatus*, but equal to the three following in *C. scambus*.

The differences above noted indicate the necessity of separating *C. scambus* as a distinct genus for which the name Plectromerus †*Dej.* may be adopted.

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* This character is otherwise only known to me in the tribe Ancylocerini, also a very anomalous form.

Tribe IV.—OBRIINI.

A tribe containing only small species, which are easily distinguished by the front coxæ being more prominent than usual, sometimes nearly conical, and frequently contiguous, but completely inclosed behind. The palpi are usually slender, rarely with the last joint triangular. The other characters are abnormal, the abdomen in the ♀ being deformed in the group Obria, and the elytra more or less subulate or abbreviated in Stenopteri; the eyes are finely granulated in the latter, variable in the former.

The affinities of this tribe lead from the last groups of Cerambycini, towards the tribes with finely granulated eyes, Lepturini on the one side, and Callidiini on the other.

Group I.—Obria.

This group contains a few small species in which the granulation of the eyes has ceased to be of primary importance; but which is easily distinguished by the 1st segment of the abdomen being very long, and the 2d and following irregular, hairy, excavated or deformed in the ♀.

The mandibles are small and acute, the antennæ slender, as long as, or shorter than, the body; the palpi are unequal, and the last joint is rarely dilated. The antennæ are slender, and the 2d joint is larger than in genuine Cerambycini. The prothorax is variable in form, always, however, constricted and pedunculated at base, and narrower than the elytra; the front coxæ are conical, prominent, contiguous, cavities small, rounded or angulated, closed behind; middle coxal cavities not open externally. The thighs are strongly clavate, the tibial spurs small or moderate, and the 1st joint of the hind tarsi is as long as the two following.

It is worthy of remark that in Obrium the structure of the eyes has merely specific significance; in our *O. rubrum* the eyes are very coarsely granulated, while in the nearly allied European *O. brunneum* the lenses are much smaller.

Our genera may be grouped as follows :—

Palpi with last joint broadly triangular. CALLIMUS.
Palpi slightly dilated ; tarsi tumid. EUMICHTHUS.
Palpi not dilated, last joint cylindrical;

Eyes coarsely granulated;	
Prothorax much narrowed behind.	PHYTON.
Prothorax equally narrowed before and behind, tuberculate at the sides.	OBRIUM.
Eyes very finely granulated; prothorax with dorsal and lateral tubercles;	
Punctures fine, flying hairs sparse.	HYBODERA.
Punctures coarse, flying hairs long, numerous.	
Mesosternum wide.	PILEMA.
Mesosternum narrow.	MEGOBRIUM.

To Callimus I would refer *C. chalybeus* Lec., a small highly polished blue species from California, with the elytra sparsely punctured, and the front thighs sometimes yellow.

Phyton contains *Callidium pallidum* Say, from the Atlantic States. Obrium has two species in the Atlantic States.

Eumichthus œdipus Lec., is a small species from Vancouver, dark brown, finely punctured and pubescent, with two narrow cinereous elytral bands, between which the color is darker. The first two joints of the tarsi are swollen.

Hybodera tuberculata, from California and Vancouver, of brown color, with a large basal patch, and posterior transverse band of pale sericeous pubescence. Besides the sculpture, it differs from Cartallum by the prothorax having four discoidal tubercles, and a smaller medial one.

Pilema contains two species from California. They resemble very much the European *Cartallum ebulinum*, but apart from the specific differences in color they have the last joint of the palpi quite cylindrical, and the mesosternum very wide.

Megobrium Edwardsii Lec. is a Californian species, 12 mm. long, of a testaceous color, with the punctures of the elytra sparse, arranged in rows near the base, obsolete behind the middle.

Lacordaire mentions that the front coxal cavities of Cartallum are not at all angulated externally; I find on repeated examination that they are quite as much so as in the genera with which I have associated it, though the coxal fissure is not as widely open as in the next tribe.

Group II.—**Stenopteri.**

A group characterized by the front coxal cavities being widely angulated externally, but entirely closed behind, and the abdomen normal in both sexes. The head is porrect, the front large and oblique, with the labrum prominent, the epistoma not separated;

the eyes are finely granulated and deeply emarginated; the mandibles are very acute, the mentum rather larger than usual, the palpi short, equal, not dilated. Antennæ punctulate and sericeous, longer than the body in some ♂, shorter in ♀. Front coxæ as above; mesosternum flat, broadly emarginate behind in Callimoxys, triangular, and truncate in Molorchus; coxæ globose, more prominent than usual, nearly inclosed externally. Abdomen with segments gradually diminishing in length, 5th segment shorter in ♂. Legs rather long, thighs strongly clubbed, hind tarsi with 1st joint twice as long as the 2d; the legs and pronotum are clothed with long flying hairs. The elytra are elongated, and subulate in Callimoxys; short, dehiscent, and separately rounded at tip in Molorchus. The stridulating surface is large and undivided in Callimoxys; very imperfect, oblong, margined each side, slightly elevated in the middle, and nearly destitute of transverse lines in Molorchus. The outer lobe of the maxillæ in Callimoxys is elongated nearly as in Rhopalophorus.

Heliomanes and Glaphyra *Newm.*, are not different from Molorchus; to Callimoxys belong the species heretofore referred to Stenopterus; the two genera occur on both sides of the continent, the latter is remarkable for having the hind tibiæ curved inwards, and furnished on the outer side with two rows of acute tubercles, giving a serrate appearance.

Our species of Callimoxys differ from (the description of) the European by having the mesosternum broad, and the thighs suddenly and strongly clavate, but these characters are probably not of generic value, and the figure of *C. gracilis* (Duval, Gen. Col. Eur., iv, pl. 45, fig. 210) would do equally well for one of our species. The prothorax varies from red to black, the latter color prevailing in the ♂.

Tribe V.—**RHOPALOPHORINI.**

A single genus Rhopalophorus (*Tinopus* Lec.) represents this tribe in the Middle, Western, and Southern States; they are small, slender insects, of blackish-gray plumbeous color, with red prothorax; the head is elongate, the front rather large, oblique, concave, with the epistoma and labrum more prominent than usual; the eyes are finely granulated, and deeply emarginate; genæ long, mandibles very acute; mentum transverse, of usual form, palpi short, equal, not dilated, outer lobe of maxillæ as long as the palpi. Antennæ slender, with the 4th joint shorter than the 3d and 5th, as long as the body in ♂, shorter in ♀, punctulate and sericeous, without poriferous system. Front coxal cavities small, not angulated, widely open behind; mesosternum somewhat obtusely pointed in front, and feebly concave each side, to complete the front coxal cavities, general surface flat, broad between the coxæ, and emarginate behind, coxal cavities small, closed. Abdomen with the 1st ventral segment longer. Legs very long and slender, thighs suddenly and strongly clubbed at the tip, hind tarsi with the 1st joint twice as long as the 2d. The elytra are flat especially at the base, and suddenly declivous so that the basal edge is unusually distinct; the scutellum is small, but obtuse, the stridulating surface is large and undivided.

This group has been considered as allied to Callichroma, but seems to me better placed as an ally of Stenopterus, etc., leading to Necydalis, and thence to Leptura.

Tribe VI.—**ANCYLOCERINI.**

Body slender, cylindrical, coarsely punctured; head short, front small, perpendicular, genæ large; eyes finely granulated, deeply emarginated, vertex concave; mandibles acute, palpi short, nearly equal, not dilated; mentum very transverse, excavated, as in most Cerambycidæ. Antennæ serrate, half as long as the body in ♀, longer than the body in ♂, very sparsely punctured, sensitive system commencing on the 3d joint, forming two well-defined spaces on the under surface, separated by the sharp edge of the joint, 11th joint oval, pointed at tip in ♀, very short and curved in ♂.

Front coxal cavities small, open behind; middle coxal cavities nearly closed by the sterna; mesosternum deeply emarginate behind. Legs slender, thighs suddenly and strongly clubbed, hind pair armed with a terminal spine on the inner side; 1st joint of hind tarsi scarcely one-half longer than the 2d. Ventral segments nearly equal in length except the 1st, which is longer.

A very peculiar tribe, recalling Ibidion by its slender, cylindrical form, but not related to it nor to any other known to me.

But one species *Ancylocera rugicollis*, black with scarlet elytra and abdomen, is found in our Southern States from North Carolina to Texas.

Tribe VII.—PARISTEMIINI.

I have adopted the name of this tribe from Lacordaire; it has two representatives in our fauna; *Pteroplatus? floridanus* Lec., a black coarsely punctured species, with two narrow orange vittæ on the prothorax, and the base and outer margin of the elytra also orange; and Holopleura n. g., found in California.

The head is moderate, mandibles small, acute, curved; the eyes large, very deeply emarginate, not very finely granulated, and embracing the base of the antennæ rather less than usual, the upper lobe is larger than usual; the front is rather flat, with the transverse suture very deep; the palpi short, with the last joint cylindrical, truncate at tip; the mentum is trapezoidal, and more porrect than in neighboring groups, being almost as in Callidium; the antennæ (♀) are a little more than half as long as the body, stout, serrate, and velvety; the 1st joint is as long as the 3d, but stouter, the 2d is one-third the size of the 3d, the 4th shorter than the 5th, which is the longest, the following diminish in length. The prothorax is rounded on the sides, truncate in front, bisinuate at base; scutellum variable in form; elytra a little wider from the base, rounded at tip, with the suture, margin, and three discoidal costæ elevated, the intermediate costa being the longest; epipleuræ well marked, extending to the tip. Prosternum narrow between the coxæ, which are rounded, with the cavities open behind, and feebly angulated externally; mesosternum flat, triangular, coxal cavities widely open externally; epimera of metathorax moderately wide, parallel. Ventral segments nearly equal. Legs short, slender, thighs not clavate, tibial spurs very small, 1st joint of hind tarsi as long as the two following.

I cannot see the stridulating organ in the specimens before me. On each side of the pronotum there is an elliptical depressed space, tolerably well defined by an acute edge, which is perhaps sexual.

This like the following tribe is a transition form; the 2d joint of the antennæ is too large for the series in which I have placed it, but, on the other hand, the front coxæ are not transverse as in the Callidioides. It seems to lead off from the latter towards the Stenaspes; it is easily recognized by the peculiar sculpture, and the costate elytra, with epipleuræ prolonged to the tip, a character I have seen in no other tribe.

Antennæ short, serrate, 11th joint appendiculate.	PTEROPLATUS?
Antennæ longer, slender, 11th joint simple.	HOLOPLEURA.

Group I.—**Rosaliini.**

A very distinct tribe, represented by *Rosalia funebris*, in Oregon and Vancouver, a large, elongate, velvety black insect, with bands and antennal rings of cinereous. The head is moderate, front not elongated, obliquely declivous, antennal tubercles not elevated, genæ long; eyes finely granulated, very deeply emarginated, upper lobe rather broad; antennæ long, outer joints sericeous, densely pubescent, joints 3–7 with a tuft of longer hair at the apex, last joint feebly divided in ♂. Mandibles stout, acute, with a small tooth near the base; mentum narrowed in front, entirely corneous; palpi nearly equal, truncate at tip. Prothorax constricted at base and apex, with an acute lateral spine each side, and two acute dorsal tubercles; prosternum rather broad, coxal cavities strongly angulated, widely open behind; mesosternum broad, truncate behind, declivous in front; epimera very large, extending to the coxal cavities; metasternum not acutely emarginate behind, episterna rather wide, narrowed behind, and nearly pointed; intercoxal process of 1st ventral broadly rounded in front, segments nearly equal in length, 5th truncate at tip, with an acute, short, medial cleft in ♀; shorter, triangularly impressed, and hairy in ♂; the last dorsal in ♂ is deeply emarginate, and in ♀ rounded and subtruncate; the 6th ventral and corresponding interior dorsal segment is prominent and truncate in ♀. Legs slender, moderately long, thighs not clavate, tibial spurs small, 1st joint of hind tarsi as long as the two following united.

The affinities of this tribe are somewhat doubtful; the scutellum is rounded behind; the mesonotum is smooth, with a broad medial vitta of stridulating surface, and a small lateral space is punctured and pubescent. The form of the front coxæ is very much as in Callidium, near which it is placed by Schiödte, but the long and tufted antennæ, with the 2d joint very small, and the tuberculate prothorax and slender legs prevent such an association. The eyes embrace the base of the antennæ rather less than in the neighboring tribes.

Tribe VIII.—CALLICHROMINI.

With this tribe commences a series distinguished by the scutellum being acute at tip, and the antennæ carinate on the lower edge, with the poriferous system arranged in a groove each side of the carina. The eyes are always very finely granulated, and deeply emarginated, embracing the base of the antennæ, with the upper lobe tolerably wide.

This tribe is further distinguished by the mandibles being long, pyramidal, nearly straight, bent only at the tip, which is acute. The outer lobe of the maxillæ is longer than the palpi, which are cylindrical; the labial palpi are much longer, feebly dilated, truncate at tip; the mentum is flat, trapezoidal, and porrect, gradually becoming coriaceous in front; the base of the maxillæ is very large and flat; the gular process for support of the mentum is nearly wanting; the genæ are long. The prothorax is constricted before and behind, armed with a strong lateral spine. Scutellum moderately large, triangular acute, mesonotum smooth, with a narrow triangular stridulating surface; elytra narrowed from the humeri, which are prominent, rounded at tip. Prosternum not tuberculate, rounded behind, coxæ globose, cavities not angulated externally, completely closed behind; mesosternum parallel, emarginate behind, coxal cavities rounded, scarcely angulated, closed by the epimera, which extend inwards further than usual; metathoracic episterna wider in front, with very distinct posterior scent pores; hind coxæ rather prominent. Ventral segments, the 1st longer, the others equal, tapering considerably; the 5th in ♀ longer than wide, subtruncate; in ♂ deeply and broadly emarginate, with the 6th joint filling the space, and rounded behind. Legs slender, hind pair elongated, tibiæ compressed, feebly carinated, spurs usually not large, 1st joint of hind tarsi nearly as long as the others united.

The last joint of the antennæ is simple in both sexes, but is much longer in the ♂.

Four species of Callichroma are found in the warmer parts of the country; they exhale an agreeable musky odor, and, with one exception, are of a beautiful blue or green color.

Tribe IX.—TRACHYDERINI.

A very large tribe as here defined, and containing as great a variety of forms as the Cerambycini, from which it is distinguished by the acutely triangular scutellum, and finely granulated eyes. The last joint of the palpi never has the triangular form which it affects in most Cerambycini, but is usually oval, squarely truncate at tip, with a deep elliptical impression on the side.* The tibiæ are not carinate, and the tibial spurs are rather long.

The following groups may be recognized in our fauna:—

- Mandibles acute, or simple at tip;
  - Pronotum broadly lobed at base; poriferous system of antennæ very distinct;
    - Metasternal pores absent, side pieces very wide. MEGADERI
    - Metasternal pores distinct. TRACHYDERES.
  - Pronotum not lobed, sometimes subsinuate at base, poriferous system often obsolete, and palpi in some genera scarcely impressed. STENASPES.
- Mandibles emarginate at tip. TYLOSES.

Group I.—**Megaderi.**

This group contains but one genus Megaderus, of which one species, *M. bifasciatus* Dupont (corallifer *Newm.*), extends from Mexico into Texas. It is a broad, flat insect, with roughly punctured prothorax, angulated on the sides behind the middle; elytra finely punctured, with a basal and medial transverse band, which are more or less confluent, separate, or even obliterated.

The antennæ are shorter than the body, with the 1st joint as long as the 3d, and a little thicker; 3d and following with poriferous spaces; outer joints velvety, 11th appendiculate, acute at tip; front rather flat, oblique; genæ long; mandibles stout, acute, palpi short, last joint not elongated, oval truncate, deeply impressed. Prothorax broad, strongly and broadly lobed at the base, deeply excavated behind the middle, especially at the sides, which are angulated; scutellum very large, acutely triangular, mesonotum sparsely punctured, with narrow medial stridulating surface; elytra finely densely punctured, rounded behind, sutural angle not rounded, nor prominent. Pro- and mesosternum very broad, the former overlapping the latter, both broadly emarginate, behind; side pieces of metathorax very wide, epimera extending

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* Among the Cerambycini with coarsely granulated eyes I have observed this form of palpi and the lateral fovea in Chion, which is an annectent form; and the same in a much less degree in some other genera. The maxillary palpi are never short as in Callichromini, nor has the ♂ an additional ventral segment. The front coxal cavities are open behind, and not angulated externally.

beyond the hind coxæ, which are widely separated; no scent pores. First ventral segment much longer; 5th longer than the 4th, broadly subtruncate at tip. Legs slender, tibial spurs long, tarsi broad, 1st joint of hind pair scarcely longer than the 2d.

An anomalous group, having an evident affinity towards Cyllene of the tribe Clytini.

Group II.—**Trachyderes.**

Insects of large size, and glabrous surface, having the antennæ compressed, much longer than the body in ♂, with very distinct poriferous system, 11th joint either simple or appendiculate; the mandibles of Dendrobias ♂ are very long, and have an acute tooth near the tip, so as to appear emarginate, without really being so. The palpi have the last joint cylindrical, and deeply foveate. The scutellum is very large, acutely triangular; mesonotum with narrow stridulating plate. Elytra convex, narrowed from the base, rounded at tip. Prothorax variable in form, tuberculate on the disk, and strongly armed on the sides in Dendrobias, uniformly convex in Lissonotus; prosternum perpendicularly declivous in both, armed also with a large tubercle in front of the coxæ in Dendrobias; mesosternum elevated, perpendicular in front; side pieces of metasternum tolerably wide, narrower behind, with scent pores in Dendrobias, without them in Lissonotus; ventral segments, 1st longer, others nearly equal. Legs rather stout, thighs moderately clubbed, tibial spurs moderate, tarsi broad, 1st joint of hind pair scarcely longer than 2d.

The two genera are found only in the most southern part of Texas, Arizona, and Lower California, and constitute two subgroups corresponding to Trachyderides, and Lissonotides of Lacordaire.

Group III.—**Stenaspes.**

I have removed from the Stenaspides of Lacordaire those genera in which the mandibles are chisel-shaped, and emarginate at the tip; and although he mentions* that in some instances this character is merely specific or sexual, I cannot avoid believing that this is only the case in genera, like Sphænothecus, composed of heterogeneous material. However this may prove on more extended observation, the group as here defined contains all those genera in our fauna in which the eyes are finely granulated, deeply emarginate, with the upper lobe wide; the scutellum acute, but not very large, though sometimes elongate; and the prothorax not distinctly lobed, but only feebly bisinuate or truncate at base. The antennæ are more slender than in Trachyderes, and the poriferous system is much less distinct, or even obsolete, though in Stenaspis it is still quite obvious, and the joints are carinate and bisulcate. In Batyle the last joint of the palpi (which is subcylindrical, and truncate) is very feebly impressed.

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* Gen. Col. ix, 167, note 1.

The antennal tubercles are either much elevated, leaving a concavity between them, or scarcely elevated, in which case the vertex is nearly flat; the front in the former is very large, square, and perpendicular, and the genæ are long; in the latter the tubercles are less elevated, the front is moderate, declivous, and the genæ usually short.

They may be thus tabulated:—

A. Front large, square, perpendicular, abruptly separated from the ante-ocular spaces;
  Prothorax bituberculate at the sides, body glabrous;
    Mesosternum protuberant. STENASPIS.
  Prothorax armed with a lateral spine; mesosternum not protuberant;
    Body pubescent. TRAGIDION.
    Body glabrous. PURPURICENUS.
  Prothorax rounded, convex. ANTHECERUS.
B. Front moderate, short, declivous, not abruptly defined each side;
  Two ivory vittæ on each elytron;
  Mesosternum declivous; (prothorax margined at apex). MANNOPHORUS.
  One ivory vitta on each elytron;
  Mesosternum protuberant; (prothorax not margined at apex). ENTOMOSTERNA.
  Elytra without ivory vittæ; mesosternum declivous;
    Body pubescent, prothorax not margined at apex. AMANNUS.
    Body pilose, prothorax margined at apex. BATYLE.

Of the three species of Tragidion, two have the elytra sulcate, while *T. armatum* has them even: there is also a difference in the hind tarsi, which are comparatively wider in *T. annulatum.* Variations in the proportions of the joints of the hind tarsi are not unusual in Cerambycidæ, as, for instance, in Criocephalus. This fact has induced me to refer *Sphænothecus cyanicollis* to

Entomosterna, instead of forming of it the new genus indicated but not named by Lacordaire.*

Of the genera tabulated above Stenaspis and Tragidion occur from the Atlantic to the Pacific in the warmer regions, the former extending northward in the central region, the latter in the Atlantic district. Purpuricenus occurs in the Middle and Western States. The next three genera are found in Texas, and Batyle occurs in the Atlantic region especially southward.

The genus last named is placed by Lacordaire in Heteropsides, of which he observes that the middle coxal cavities are closed externally; I find, however, in my specimens that the mesothoracic epimera attain the coxal cavities, and that they are as open as in Purpuricenus. The character as used by Lacordaire seems to me very deceptive, and without value for systematic results.

Group IV.—**Tyloses.**

Closely related to the preceding, and only differing in fact by the mandibles not being acute at tip, but truncate, forming a chisel-shaped edge, which is emarginate. The front is moderate in size, nearly perpendicular, and the antennal tubercles are not much elevated; the genæ are not elongated. The scutellum is small, acutely triangular, and the stridulating plate of the mesonotum is large. The side pieces of the metasternum are tolerably wide, not narrowed behind, and the scent pores are distinct, except in *Perarthrus vittatus* and *Sphænothecus bivittatus*. The legs are slender, thighs not clavate, tibial spurs rather long, hind tarsi with the 1st joint equal to the two following; less slender in Tylosis and Crossidius than in the other genera. The antennæ are slender, with elongate sensitive spaces near the carina of the under margin. The last joint of the palpi is subcylindrical, and impressed, as usual, in the other groups of this tribe.

Our genera, which are found mostly in Texas, Arizona, and Lower California (Crossidius alone extending into Colorado, California, and Oregon), may be tabulated thus:—

A. Elytra without ivory vittæ;
Prothorax with an acute lateral spine;
Eyes not divided (pubescence fine). . OXOPLUS.
Eyes divided (pubescence coarse). SCHIZAX.

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* Gen. Col. ix, 184, note 3.

Prothorax rounded on the sides, with dorsal callosities. **TYLOSIS.**
Prothorax rounded on the sides, or feeble spinose, without dorsal callosities (pubescence long and partly erect). **CROSSIDIUS.**
Prothorax narrowed in front, mesosternum protuberant. **SPHÆNOTHECUS.**
B. Each elytron with two ivory vittæ; prothorax narrowed in front;
Mesosternum declivous, body robust. **PERARTHRUS.**
Mesosternum protuberant, body slender. **ISCHNOCNEMIS**

Schizax is established on a remarkable insect, *S. senex* Lec., from Arizona; the color is black, the pubescence is coarse, dirty white, with the scutellum, suture and side margin of elytra densely clothed with yellow pubescence; the elytra rounded at tip, with the suture slightly prominent; the antennæ are slender, and very long in the ♂.

To Crossidius belongs *Callidium discoideum* Say, which is identical with Cr. pulchrior *Bland.* The reference of Say's species to Eriphus (now Batyle) was incorrect, and was owing to my not having properly identified the insect.

To Sphænothecus I would refer *S. suturalis* Lec., from New Mexico, while the Mexican and Texan *S. bivittatus* Dupont, having distinct ivory vittæ seems to belong more properly to Ischnocnemis *Thomson.*

Tribe X.—STENOSPHENINI.

Closely allied to the Cyllene group of Clytini, but the punctures are sparse and coarse, the pubescence scanty, and the general form more slender. The head is small, narrow and porrected in two of the species, with the front elongated, and very slightly declivous; but shorter and nearly vertical in *Stenosphenus notatus.* The eyes are finely granulated, deeply emarginated; the antennal tubercles are not elevated; antennæ as long as the body in ♀, somewhat longer in ♂, setaceous, punctured and pubescent, not sericeous, sparsely clothed beneath with flying hairs; 2d joint small, 3d longer than 4th, 3–7 armed with an apical spine on the inner side, as in Elaphidion. Palpi short, subequal, last joint nearly cylindrical, truncate at tip, not impressed. Prothorax rounded on the sides, without spines or callosities. Scutellum rounded behind, mesonotum covered with fine stridulating surface, with a few punctures each side near the edge. Elytra truncate at tip, and armed with two apical spines as in most species of Elaphidion.

Front coxal cavities rounded, open, prosternum suddenly de-

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clivous, and perpendicular behind; middle coxæ inclosed by the sternal pieces, not angulated externally; mesosternum rather broad, protuberant, suddenly declivous in front, truncate or broadly emarginate behind, side pieces moderately large, intervening between the sterna, but not extending to the coxæ. Metasternum acutely emarginate behind for the reception of the intercoxal process, episterna linear, ventral segments gradually decreasing in length.

Legs rather short, thighs not clavate, not spinose at tip; tibiæ strongly carinated, with the 1st joint as long as the two following united.

The closest affinities of this genus in the series with finely granulated eyes are evidently with Cyllene, but there is an equally evident cross affinity in the direction of Elaphidion, Sphærion, etc.

Batyle, associated with Stenosphenus by Lacordaire, has the scutellum acutely pointed, the hind legs elongated, the antennal tubercles more elevated, and the eyes more prominent. It seems to me a degraded ally of Purpuricenus, and I have placed it accordingly.

Tribe XI.—CLYTINI.

A tribe containing many species, but on account of the variation in appearance and characters very difficult to define. The head is sometimes rather small, sometimes large, the front long, quadrate, and vertical in some, short and oblique in others, eyes finely granulated, deeply emarginate, with the lower lobe always large; antennæ with the outer joints sericeous, usually shorter than the body in both sexes, sometimes longer in the ♂, joints 3–7 in some genera (Cyrtophorus) armed with an apical spine; palpi short, equal, dilated, but not very broadly, last joint impressed; mandibles short, stout, acute; mentum nearly semicircular, corneous. Front coxal cavities rounded, open behind, not angulated externally; middle cavities usually open, sometimes (Euderces, etc.) closed externally, side pieces large, articulating with the metasternum, so as to interpose between the meso- and metasternum; the latter with the side pieces usually wide, sometimes narrow. Legs long, thighs sometimes slender, sometimes clubbed, spines of hind tibiæ usually well developed, tibiæ not carinated, hind tarsi with first joint usually very elongate. Ventral segments diminishing gradually in length.

The scutellum is obtusely triangular in some species of Cyllene, rounded in the other genera; the mesonotum is punctured, and hairy at the sides, and has a large undivided, very finely striate stridulating surface.

The genera are numerous, and indicate three groups; the affinities are in various directions, to Megaderus, Callidium, and by a gradual transition in Euderces, etc., towards certain Lamiides. Nearly all the species of this group are varied with bands of yellow, white, and black pubescence, and the sculpture is always of fine punctures; in some species small elevations on the prothorax are intermixed with the punctures.

Groups may be defined as follows:—

Epimera of metathorax produced over the angles of the 1st ventral segment, so as to inclose the hind coxæ externally; episterna of metathorax usually wide;
  Front short, intercoxal process rounded. CYLLENES.
  Front large, intercoxal process acute. CLYTI.
Epimera of metathorax not produced, episterna linear; front large; intercoxal process of abdomen acute. ANAGLYPTI.

Group I.—**Cyllenes.**

The head is comparatively small, the front short and oblique, the antennæ in Cyllene better developed than in the other genera, and longer than the body in ♂, nearly as long in ♀; in some of the species of that genus they are thicker at the base, as in many Callidia. The body is rather stouter and less convex than in the other groups; the prosternum is sometimes very broad, and the mesosternum gibbous, or perpendicularly declivous in front; the episterna of the metathorax are wide, and the epimera prolonged over the side angles of the 1st ventral segment, the intercoxal process of which is rounded in front. The legs are moderate, and not very unequal in length, scarcely clubbed, not spinose at tip. The affinities are partly with Megaderus, and partly with Callidium; the scutellum is usually rounded behind, but is quite distinctly triangular in some species of Cyllene.

The genera may be tabulated as follows:—

Pronotum transversely excavated at the sides, near the base, prosternum perpendicular at tip, mesosternum usually perpendicular in front. CYLLENE.
Mesosternum oblique or nearly flat, prosternum declivous at tip, not perpendicular, pronotum not excavated at the sides, but only rounded, and constricted at base;

Antennæ compressed, subserrate.	Glycobius.
Antennæ filiform;	
Mesosternum declivous.	Calloides.
Mesosternum nearly flat, episterna narrower.	Arhopalus.

Glycobius *Lec.* is founded upon *C. speciosus* Say, a large black and yellow species which infests the sugar maple.

Calloides *Lec.* contains *C. nobilis* Harris, a large species of the Atlantic States, and the nearly allied *C. Lorquini* Buquet, of California. Arhopalus *Serv.* (*Sarosesthes* Thomson) contains only *C. fulminans* Fahr.

Group II.—**Clyti.**

The head is larger than in the Cyllenes, and the front much longer, sometimes perpendicular, and quadrate; the antennæ are always short, not very different in the sexes, filiform, or slightly thickened externally; the episterna of the metathorax are usually wide, and the epimera are produced over the angles of the 1st ventral segment, the intercoxal process of which is acute. The thighs are usually clavate, the hind pair frequently very long, and occasionally spinose at tip; the first joint of the hind tarsi usually very long.

Front rounded, declivous, thighs not spinose at tip, episterna of metathorax wide;	
Head not carinated.	Clytus.
Head carinated.	Xylotrechus.
Front quadrate perpendicular; head not carinated;	
Episterna of metathorax wide.	Neoclytus.
Episterna of metathorax narrow.	Clytanthus.

Clytus is represented by *C. marginicollis* Lap. in the Atlantic States, and *C. lanifer* Lec. in Arizona.

Clytanthus by *C. ruricola* Oliv. and *albofasciatus* Lap. in the Atlantic States.

The other two genera are distributed over our whole territory, and contain many species.

Group III.—**Anaglypti.**

The head is also large, and the front long, and quadrate; the antennæ slender, moderately long, with the joints 3–5 sometimes spinose at tip; the prothorax is not narrowed in front, but always much constricted behind; the elytra are frequently gibbous at the base, and declivous at tip, and sometimes have transverse ivory bands. The episterna of the metathorax are narrow, and the epimera are scarcely produced over the angles of the 1st ventral; the intercoxal process is acute. The legs are moderate in length, and the thighs somewhat strongly clubbed, and not spinose at tip; the 1st joint of the hind tarsi is less elongated than in the other groups. The mesonotum is not punctured at the sides, and is covered with very fine stridulating lines.

In some of the genera the middle coxal cavities are nearly or entirely closed externally, but as in other portions of the series, the transition is accomplished by such slight gradations that the character seems to have little value.

2d joint of antennæ equal to 4th;	
Antennæ not spinose, elytra without ivory spots.	Microclytus.
2d joint of antennæ short, 3d longer than 4th;	
Elytra without ivory spots;	
Eyes oblique, emarginate.	Cyrtophorus.
Eyes entire, rounded.	Tillomorpha.
Elytra with a transverse ivory band.	Euderces.

Microclytus is founded upon *C. gazellula* Hald. a species of the Middle States, having entirely the form and coloration of the European *Anaglyptus mysticus*, but smaller, and differing essentially by the 2d joint of the antennæ being fully half as long as the 3d, and scarcely shorter than the 4th joint; the flying hairs are peculiarly long and numerous; the eyes are oblique, emarginate above, and pointed behind, as if the usual deeply emarginated form had been shortened by the obliteration of the upper part. The same form is seen in *Cyrtophorus verrucosus*, but less acute at the upper angle. In *Tillomorpha geminata* (Hald.) the eyes are oval, not at all emarginate, the upper part being absent; and in Euderces they are entirely divided, the lower part being emarginate, acutely pointed above, and the upper part small, distant, and oval.*

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* Lacordaire, Gen. Col. ix, 89, observes that this character, mentioned by me in the original description of the genus, has completely escaped him; it is quite obvious in all the specimens before me, though in *Eu. picipes* the two parts of the eye are connected, as in Tetropium, by a line of corneous material, without lenses; even this line is wanting in *Eu. pini*, so that the eye becomes as completely divided as in Tetraopes.

Tribe XII.—AGALLISSINI.

A tribe composed of a single genus Agallissus *Dalman* (*Cryptopleura* Lec.) which is remarkable for having the epipleuræ strongly sinuated near the humeri. Head small, front short, vertical in *A. clerinus*, quadrate, oblique in *A. gratus;* eyes finely granulated, deeply emarginate; antennal tubercles not elevated, antennæ slender, shorter than the body in both sexes, finely punctulate, and sericeous, 11th joint feebly appendiculate; mandibles small, stout, acute, genæ moderately short; mentum transverse, of the usual form, entirely corneous; palpi short, equal, not dilated. Front coxæ small, not prominent, cavities rounded, open behind; middle coxal cavities angulated externally, mesosternum suddenly declivous in front. Epimera of metathorax very wide in front, gradually narrowed behind; ventral segments slightly decreasing in length; legs short, slender, thighs not clavate, spurs small, 1st joint of hind tarsi but little longer than the 2d.

The prothorax is rounded on the sides, not transverse, the elytra are wider at base than the widest part of the prothorax, and the humeri are rather prominent, as in many Lepturidæ. The scutellum is obtusely rounded behind, the mesonotum is smooth and polished, with a large, very fine stridulating plate. Flying hairs of moderate length are seen over the general surface of the body, and on the legs.

Two species occur in our fauna, *A. gratus* (Cryptopleura grata *Hald.*) from Texas, and Northern Mexico, shining black, sparsely punctured, with the elytra narrowed behind, truncate and finely serrate at tip, ornamented with yellow spots, of which the basal pair are elongate; and *A. clerinus* from Florida, opaque black, very coarsely and densely punctured; prothorax red, with faintly indicated dorsal smooth spots; elytra parallel on the sides, rounded at tip, with a round basal spot, and two broad transverse bands bright scarlet. Length 13 mm.

I consider this as the nearest approach made by the genuine Cerambycidæ to the Stenocorus group of Lepturidæ. It is, however, quite an isolated form, and the two species above mentioned should probably be regarded as distinct genera.

Tribe XIII.—**ATIMIINI.**

One genus with two species constitutes this group, which has lost entirely the characteristic form of the Cerambycidæ, and resembles a rather stout Lamiide. The head is broad and short, the front perpendicular; the eyes large, deeply emarginate, almost in fact divided, and not very finely granulated; labrum transverse, ciliated with very long hairs; mandibles slender and acute; mentum trapezoidal, corneous; palpi unequal, scarcely compressed, truncate at tip, the maxillary about half longer than the labial. Antennæ slender, shorter than the body in both sexes, 11-jointed; 2d joint less than half as long as the 3d, which is a little shorter than the 4th, punctured and pubescent, not sericeous. Front coxæ rounded, somewhat large, widely separated by the prosternum, cavities not angulated externally, *completely closed* behind; middle coxæ widely separated by the mesosternum, which is truncate behind and gradually declivous in front; coxal cavities slightly angulated externally, completely closed by the sterna; metathoracic episterna moderate, neither wide nor narrow; metasternum unusually deeply emarginate behind, for the reception of the acute intercoxal process; ventral segments slightly decreasing in length, the 5th in ♀ a little longer than the 4th and truncate. Legs short, thighs moderately clavate, tibiæ with small spurs, hind tarsi with 1st joint equal to two following united.

The scutellum is subquadrate, rounded behind; the mesonotum has a large stridulating surface, divided by a dorsal furrow, as in Leptura and allied genera.

The body is densely clothed with long, coarse, luteous hair, with some denuded spots on the thorax and elytra; the former is quadrate, transverse, scarcely rounded on the sides, and coarsely punctured, the latter a little broader, truncate at tip, more finely and very sparsely punctured, with several rows of very distant larger punctures. The front tibiæ are without any vestige of the oblique groove seen in Lamiæ.

Atimia confusa (Clytus conf. *Say*) occurs in the Middle States and Canada; and *A. dorsalis* Lec. on the Pacific slope.

Tribe XIV.—DISTENIINI.

This tribe, represented only by *Distenia undata* in our fauna, exhibits so many peculiarities that it may well be viewed as a survivor of the synthetic types of former times. The combination of the form of eyes of Prionidæ, with the ligula of the same sub-family, large globose front coxæ (as in Achryson), long, slender antennæ; spinose prothorax and elytra (as in many Cerambycoides), a divided stridulating organ (as in Lepturoides), with a peculiar form of mandibles, not known to me otherwise in the whole family, is very remarkable. The form of body and general appearance is intermediate between a slender Cerambycoid and a Lepturoid. Lacordaire has very properly given to this type, as the 3d division of the true Cerambycidæ, the greatest prominence it could have in his system.

Body elongate, head large, horizontal; eyes transverse, large, rather coarsely granulated, feebly emarginate, not embracing the base of the antennæ; neck moderately constricted; front very short, suddenly declivous between the antennæ, epistoma large, quadrate, horizontal, labrum large, broader than long. Antennæ long, setaceous, 1st joint as long as the head, comparatively slender, 2d joint small, but with its condyle very much protruding from the 1st joint; following joints equal in length, pubescent, not sericeous, without distinct sensitive spaces, fringed beneath with long, fine, close lying hairs, which extend far beyond the end of each joint, from the 4th to the 10th. Palpi very unequal, maxillary with the last joint elongate triangular, rounded at tip, not impressed, labial shorter, last joint thick, rounded triangular. Ligula large, corneous, feebly emarginate in front, supports of palpi small, widely distant. Mandibles thick, curved, chisel-shaped at tip, apical edge vertical, sharp, straight. Prothorax with dorsal elevations, and acute lateral spine, constricted near apex and base, which are truncate. Scutellum rounded behind, mesonotum with large stridulating plate, divided by a smooth dorsal stripe. Elytra wider in front, gradually narrowed from the humeral angles, bispinose at tip. Prosternum very narrow between the coxæ, which are very large, globose, and prominent, cavities widely open behind, not at all angulated externally. Mesosternum rather wide, parallel, emarginate behind, coxal cavities narrowly angulated externally, but closed by the contact of the sternal pieces. Episterna of metathorax long and narrow, nearly pointed behind; scent pores not very distinct, though the insect has an offensive odor when alive. Hind coxæ rather convex, though distinctly separated. Ventral segments nearly equal in length, 5th in ♂ semicircularly emarginate at tip. Legs slender, hind pair longer, middle tibiæ with a singular oblique groove on the outer face, below the middle; tibial spurs distinct; 1st joint of hind tarsi as long as the two following.

Tribe XV.—**DESMOCERINI.**

This tribe is represented by two species of Desmocerus, *D. palliatus* in the Atlantic, and *D. auripennis* in the Pacific States. Though by the large conical and contiguous front coxæ, and the divided stridulating surface of the mesonotum it belongs to the Lepturoid series, it differs remarkably from the other genera by the much smaller and stouter mandibles, which are not at all fringed on the inner margin. The ligula is large, membranous, and bilobed, though less deeply so than in Lepturini; the palpi are short, not dilated; the mentum is large, trapezoidal, and the gular process very short. The eyes are finely granulated, nearly rounded, suddenly and deeply emarginate towards the base of the antennæ, which are 11-jointed, with the joints 3–5 thickened at the end, and the outer ones velvety black; the vertex is prominent, deeply sulcate, suddenly perpendicular in front of the antennæ, front horizontal, advancing as in other Lepturoides (and also in Distenia) between the base of the mandibles; labrum large, not emarginate. Prothorax gradually wider behind, obtusely angulated on the sides, hind angles prolonged, acute; scutellum rounded behind, stridulating plate of mesonotum large, divided by a smooth furrow. Elytra parallel, coarsely punctured, obliquely rounded behind. Prosternum very narrow between the coxæ, which are large and conical with the cavities angulated externally and open behind; mesosternum narrow, subemarginate at tip, coxal cavities widely open externally; episterna of metathorax wide, subparallel, suddenly narrowed behind. Hind coxæ prominent, contiguous at the inner side; ventral segments subequal; legs slender, tibial spurs moderate, tarsi rather broad, hind pair with 1st joint scarcely equal to the two following united.

In the ♂ the 5th ventral segment is slightly emarginate at tip, and the antennæ are stouter. The insects are found on species of Sambucus.

Tribe XVI.—NECYDALINI.

Head large, suddenly, but not very deeply constricted far behind the eyes, which are finely granulated, large, oblique, deeply emarginate; the front is very large, quadrate, and vertical, the genæ long, and the hypostoma limited each side by an oblique ridge; the antennæ are inserted high up on the top of the front between the eyes; the mandibles are small, stout, pointed, and fringed with hair on the inner margin; the palpi are very short, the last joint oval and deeply impressed in Ulochætes, bell-shaped and feebly impressed in Necydalis. Antennæ filiform, longer in ♂; 2d joint small; 3d and 4th united not longer than the 5th in Ulochætes; 3d and following joints equal in Necydalis. Prothorax deeply constricted before and behind, and tuberculate on the sides. Scutellum elongate, triangular; stridulating plate of mesonotum large, undivided. Elytra very short, dehiscent, separately rounded at tip; dorsal segments exposed, entirely corneous; wings not folded at tip, but lying straight along the abdomen. Prosternum very short in front of the coxæ, narrow between them, coxæ large, conical, prominent, nearly contiguous, cavities angulated externally, closed behind; mesosternum subtriangular, truncate behind; coxæ prominent, cavities open externally; metathoracic episterna wide in front, narrowed behind; hind coxæ prominent, nearly contiguous. Abdomen gradually narrowed behind and nearly pointed in ♀, slightly thicker at the extremity in ♂; ventral segments equal in length, 5th in ♂ broadly emarginate. Legs slender, hind pair much longer, tibial spurs small, tarsi narrow, 1st joint elongate, not brush-like beneath, in front pair equal to 2d and 3d united, in middle pair equal to all the others united, in the hind pair much longer.

This tribe is represented in our fauna by *Necydalis mellitus* Say in the Atlantic, two species of the same genus, and *Ulochætes leoninus* in the Pacific States. The latter is a large, robust, and very hairy insect, which is well figured in the Pacific R.R. Explorations, vol. xi, pl. 2, f. 12.

The undivided stridulating plate is an exception in the Leptuoid series, to which I have attached this remarkable tribe, and with which it has very strong relations. It would perhaps be better to view it as representing a separate series, in which might be placed various foreign tribes in which the wings are not folded at the end. In this connection, it is important to observe that in Stenopterus and Molorchus, which have abbreviated elytra. the wings are not straight, but folded in the usual manner.

Although the under surface of the head is limited each side by a line, as in other Lepturoides, the line is less defined and the mentigerous process is not more developed than in Cerambycoides, and the mentum has the short transverse form so frequent in that series, and totally unlike the ordinary Leptura type.

Prof. Lacordaire describes the front coxal cavities as open behind, but they are very evidently closed in *N. mellitus.*

Tribe XVII.—**ENCYCLOPINI.**

The head is quadrate, suddenly but not strongly narrowed and constricted far behind the eyes (so that the neck is very short); front large, quadrate, nearly vertical, eyes finely granulated, obliquely emarginate, with the antennæ inserted high up on the front near the emargination; antennæ 11-jointed slender, with $4\frac{2}{3}$ joints punctured, the rest sericeous, genæ rather long; mandibles small, acute, fringed with hair on the inner margin; labrum rather large; palpi moderate, unequal, last joint rounded triangular; hypostoma very distinctly defined each side, mentigerous process short, broad, distinct, mentum large, trapezoidal; prothorax constricted before and behind, wider at the base, tuberculate on the sides. Scutellum small triangular; mesonotum in Encyclops punctured and hairy, with a very narrow median smooth space, which is carinated, but does not appear to be stridulating; in Leptalia the stridulating surface is large, and divided by a fine dorsal groove; in Pyrotrichus not examined. Elytra elongate, parallel, separately rounded in Encyclops, feebly truncate in Pyrotrichus. Front coxæ conical prominent, nearly contiguous, cavities angulated, open behind; mesosternum triangular, coxal cavities open externally; metathoracic episterna narrow, pointed behind; hind coxæ not prominent; ventral segments nearly equal, the 1st a little longer, the 5th a little shorter. Legs slender, hind pair longer, tibial spurs small; tarsi in Encyclops slender elongated, 1st joint of all much longer, and on the hind tarsi without brush of hair beneath; in Leptalia the first joint of hind tarsi is sulcate, with a line of

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pubescence each side; in Pyrotrichus wider, with usual covering beneath, and only as long as the 2d and 3d united.

The eyes are very deeply emarginate in Pyrotrichus, rounded, with a small but distinct emargination in Encyclops, feebly emarginate in Leptalia.

The genera may be thus distinguished:—

Tarsi wider, joints 1—3 brush-like beneath. PYROTRICHUS.
Tarsi slender, 1st joint very long;
  Hind tarsi with basal joint sulcate, brush-like at the sides. LEPTALIA.
  Hind tarsi with basal joint cylindrical. ENCYCLOPS.

The differences in the tarsi are similar to those observed in the three groups of Lepturini. Pyrotrichus being similar to Stenocorus, Leptalia to the Toxotus group, and Encyclops to the genuine Lepturæ.

To Leptalia belongs *Anoplodera macilenta* Mann. a black species from Alaska; A. Frankenhæuseri *Mann.* is a variety with striped elytra and yellow legs; Leptura fuscicollis *Lec.*, is a larger variety from Vancouver and California, in which the elytra are also striped, and the legs yellow, sometimes varied with black. The reference to Anoplodera was singularly inappropriate, since the sides of the prothorax are armed with a rather acute tubercle, almost as in Centrodera.

Tribe XVIII.—LEPTURINI.

The numerous species composing this tribe are easily recognized by the prominent conical front coxæ, with the cavities angulated externally, open, sometimes almost closed, behind; middle coxal cavities widely open externally; the palpi are always unequal, the maxillary elongated, the last joint cylindrical, or triangular, impressed. The head is variable in form, either gradually narrowed behind the eyes, or suddenly and strongly constricted, in either case the neck is long; the front is slightly declivous, and the antennæ are inserted well in front of the eyes, or slightly between them; the eyes are oval, longitudinal, or slightly oblique, entire or emarginated. The mandibles are flat, acute, and fringed on the inner margin. The hypostoma is defined by very distinct lateral lines, the mentigerous process is very distinct, and the mentum flat and trapezoidal. The other characters are variable, the antennæ are usually slender, sometimes subserrate; the prothorax is usually wider at base, sometimes tuberculated at the sides; the elytra usually narrowed from the base, sometimes bispinose at tip, sometimes acute and dehiscent, but usually rounded and dehiscent.

The species occur on flowers, are generally prettily colored, and usually clothed with fine pubescence.

A. First joint of hind tarsi with the usual brush of hair beneath (except in certain Acmæops).
  a. Prosternum prominent between the coxæ. STENOCORUS.
  b. Prosternum not prominent, front coxæ conical, protuberant; head not suddenly constricted behind. (TOXOTI.)
 Eyes large, coarsely granulated. CENTRODERA.
 Eyes smaller, coarsely granulated. XYLOSTEUS.
 Tibial spurs not terminal (eyes variable). TOXOTUS.
 Eyes finely granulated, tibial spurs terminal;
  Prothorax acutely armed on the sides;
   Eyes moderate, feebly emarginate. PACHYTA.
   Eyes large, strongly emarginate. ANTHOPHYLAX.
   Eyes very small, entire. PIODES.
  Prothorax obtusely angulated or rounded on the sides; eyes small, entire;
   Mesosternum not protuberant. ACMÆOPS.
   Mesosternum protuberant. GAUROTES.
B. 1st joint of hind tarsi without brush-like sole; prosternum not prominent; head strongly and suddenly constricted behind; eyes finely granulated, deeply emarginate. (LEPTURÆ.)
 Last ventral segment of ♂ deeply excavated; body very slender;
  Elytra strongly sinuate on the sides; antennæ without poriferous spaces. BELLAMIRA
  Elytra less sinuate on the sides; antennæ with poriferous spaces on the outer joints. STRANGALIA.
 Last ventral segment of ♂ not excavated;
  Antennæ with large poriferous spaces. TYPOCERUS.
  Antennæ without poriferous spaces;
   Hind coxæ not contiguous. LEPTURA.
   Hind coxæ contiguous. EURYPTERA.

The type and only species of Bellamira is the large and elegant *Leptura scalaris* Say (Toxotus coarctatus *Hald.*) of the Atlantic States.

To Euryptera belongs *Lept. lateralis* Oliv. (distans *Germ.*).
Stenocorus *Geoffroy* is equivalent to Rhagium *Fabr.*

Sub-Family III.—LAMIIDÆ.

The members of this sub-family are usually very easily recognized by (1) the prothorax not being margined; (2) the palpi with the last joint cylindrical and pointed; and (3) the front tibiæ obliquely sulcate on the inner side. One of these characters is occasionally absent, but the other two will then, with the general appearance of the insect, make its affinities unmistakable. To the first character there is no exception in our fauna, and only the Tmesisternus group of the other continent; Michthysoma, having the last joint of the palpi triangular, is the only exception in North America to the second character; the third character is lost in some genera of low organization, such as Methia, Dysphaga, which are only feebly differentiated from the Oeme group of Cerambycidæ.

The front is vertical, usually large and flat, rarely shorter and convex; the eyes are usually finely or moderately finely granulated, rarely quite coarsely granulated; emarginated, frequently divided, sometimes (Spalacopsis) with the upper lobe wanting.* The front coxæ are rounded, never transverse, the coxal fissure is frequently open, so that the cavity becomes angulated, but this character, as in Cerambycidæ, is not of great importance; they are closed behind in nearly all, widely open in Methiini, with a tendency to become open in Monohammini. The middle coxæ are entirely closed by the sternal pieces in the higher forms of each series, open to the side pieces in the others, but this character is also of small importance. The metasternum never has scent glands; and the stridulating organ of the mesonotum is always undivided, though frequently narrow. The ventral segments are always 5, and present no remarkable characters. The legs are usually short, sometimes (Monohammus ♂, Dorcaschema) long; middle tibiæ with a tubercle or sinus on the outer face in most genera; tibial spurs short; ungues either *divaricate* (extending in a plane at right angles to the length of the last joint), or *divergent* (not in the same plane, but forming an angle). This character, first observed by Lacordaire, seems to be of great value; in the true Cerambycidæ the claws do not appear to vary to the same extent, but to be slightly moveable in nearly all, if not all, the species.

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* **This character has been already noticed in the Clytini, group Anaglypti, v. sup. p. 320.**

I would arrange the tribes represented in our fauna into series, as follows:—

I. Humeral angles not prominent; metasternum short; wings wanting; front tibiæ sulcate. DORCADIOIDES.
  A. Front large, palpi slender;
    Support of labrum distinct, coriaceous. DORCADIINI.
    Support of labrum not visible. MONILEMINI.
  B. Front short, oblique, palpi dilated. MICHTHYSOMINI.
II. Humeral angles distinct, wings perfect, elytra entire; front tibiæ sulcate;
  A. Body small, elytra gibbous or spinose near the base; prothorax constricted behind, front large inflexed, ungues divergent. CYRTINOIDES.
    Front coxal cavities rounded. CYRTININI.
    Front coxal cavities angulated. PSENOCERINI.
  B. Body elongated, usually large, elytra not gibbous; scape of antennæ with an apical cicatrix (except Deroaschema), front coxal cavities angulated, sometimes a little open behind; eyes rather finely granulated; (ungues usually divaricate, but variable). LAMIOIDES.
    MONOHAMMINI.
  C. Ungues divergent.
    a. Scape of antennæ with an open apical cicatrix; front coxal cavities angulated, middle coxæ open; eyes finely granulated; body broad. MESOSOIDES.
      MESOSINI.
    b. Scape of antennæ without cicatrix; front coxal cavities variable, middle coxæ open. ONCIDEROIDES.
      Front large, flat; front coxæ angulated. ONCIDERINI.
      Front convex; front coxæ nearly round; eyes very coarsely granulated. ATAXIINI.
      Front inflexed, form very elongate. HIPPOPSINI.
  D. Ungues divaricate; scape of antennæ without cicatrix;
    a. Front coxæ rounded, middle coxæ closed or nearly so; form usually stout. ACANTHODEROIDES.
      Scape of antennæ clavate. ACANTHODERINI.
      Scape of antennæ long, slender. ACANTHOCINI.
    b. Front coxæ angulated, middle coxæ open. POGONOCHEROIDES.
      Support of labrum coriaceous. POGONOCHERINI.
      Support of labrum not visible. DESMIPHORINI.
    c. Front coxæ protuberant, subconical, cavities angulated; middle coxæ open externally; eyes very finely granulated; form cylindrical, prothorax never armed, rarely tuberculate on the sides. SAPERDOIDES.

Ungues simple (except the outer one of front and middle tarsi in certain ♂). SAPERDINI.
Ungues cleft or appendiculate. PHYTOECINI.
III. Humeral angles distinct, wings perfect, elytra abbreviated; front tibiæ not sulcate, claws divaricate. METHIOIDES.
Front coxal cavities angulated, widely open behind; middle coxal cavities open externally; front short, eyes very large, coarsely granulated; oral organs atrophied. METHIINI.

Tribe I.—**DORCADIINI.**

This tribe, represented by numerous species in the Mediterranean region of the Eastern continent, has but two representatives, Plectrura and Ipochus, in our fauna; the former, a brownish insect with rows of shining tubercles on the elytra, which at the apex are prolonged into acute serrated cusps; the sides of the prothorax are armed and serrate; it is found in Oregon, Vancouver, and Alaska. Ipochus, a very convex form, clothed sparsely with long erect hair, with bands of white pubescence on the elytra; the prothorax rounded, not armed; found in the southern part of California.

These two genera represent separate groups, the former, Dorcadia, having slender almost pointed palpi, and wide intercoxal process of 1st ventral segment; the latter, Parmenæ, having the palpi stouter, last joint oval, obliquely truncate, and the intercoxal process of 1st ventral segment acute.

The tribe is readily recognized by the absence of wings, the consequently short metasternum, and by the elytra having no humeral angles; the large quadrate vertical front; the support of the labrum coriaceous and distinct. The ungues are divaricate, and the last tarsal joint long. The front coxal cavities are widely angulated, closed behind; the middle coxal cavities widely open externally, with distinct trochantin. The eyes are coarsely granulate. Habits epigæal.

Tribe II.—**MONILEMINI.**

These are large species of black color, rarely (*M. albopictum* White) varied with whitish pubescence; the antennæ are, however, always annulate. They are found in the interior region of the continent, extending into Texas and Lower California.

The characters of the tribe are: front large, quadrate vertical, support of labrum not visible; wings none, metasternum short, elytra without humeral angles; palpi slender, last joint obtusely pointed.

Additional characters are: eyes rather finely granulated, small, deeply emarginate; front coxal cavities rounded, closed behind; middle coxal cavities angulated externally but closed; ungues divaricate, last tarsal joint less elongated than in Dorcadiini. Intercoxal process of 1st ventral segment wide.

Mr. James Thomson has established Omoscylon on *M. subrugosum* Bland, a species of Lower California in which the prothorax has no lateral spine. The distinction is illusive, as all gradations in the degree of development of the spine are seen, from *M. armatum* where it is large and acute to *M. annulatum* Say, where it is obtuse, and finally to *M. appressum* Lec., and *subrugosum*, where it is wanting.

Tribe III.—**MICHTHYSOMINI.**

I have established this tribe on the very anomalous *Michthysoma heterodoxum* Lec., of which I found a single specimen in the mountain region of Georgia. The head is rather large, the front short, scarcely vertical, the support of labrum visible, coriaceous, labrum small, rounded in front. Palpi very unequal, with the last joint securiform. Antennæ slender, as long as the body, scape rather stout, as long as the 3d joint, rounded at tip, without cicatrix; 3d joint not longer than 4th; eyes small elongate, coarsely granulated, lower lobe narrow. Prothorax as wide as the head, with an acute lateral spine, rather in front of the middle. Elytra elongate not wider than prothorax. Intercoxal process of first ventral segment acute.

Front coxal cavities angulated, closed behind; middle ones angulated, closed externally; thighs strongly clavate, front tibiæ curved inwards and feebly sulcate, middle ones absolutely without tubercle, sinus, or tuft of hair on the outer margin; tarsi less dilated than usual, 1st joint of hind pair equal to two following united; last joint moderate, claws divaricate.

The form of the palpi seems to show an affinity with the African genus Phantasis, but the body is much more elongate, and the other characters do not agree. The head and prothorax are densely punctured and opaque, the elytra more shining, less densely punctured, with hairs proceeding from the punctures.

Tribe IV.—CYRTININI.

This tribe is represented in the Atlantic States by a single species of Cyrtinus (*Clytus pygmæus* Hald.), and is very anomalous in its characters.

The front is large, inflexed, somewhat convex, and the mouth is small; palpi slender, pointed; eyes small, divided, coarsely granulated; antennæ a little longer than the body, scape slender, without apical cicatrix. Prothorax smooth, oval, very convex, constricted at base; elytra with rounded humeri, wider behind, very convex, each with a large acute spine near the scutellum. Wings perfect.

Front coxæ large, rounded, cavities not angulated, closed behind, prosternum scarcely longer in front than behind the coxæ; middle cavities slightly angulated, closed externally; legs stout, thighs strongly clavate, middle tibiæ with a faint sinus on the outer margin; hind tarsi shorter than the tibiæ, 1st joint equal to the two following, last joint rather large; claws apparently moveable, as they are sometimes very widely divergent, and almost divaricate, at others quite near together. The metasternum is very little longer than the 1st ventral segment, and the intercoxal process is acute. This is the smallest Lamiide in our fauna.

Tribe V.—PSENOCERINI.

Also represented by a single very small species of Psenocerus in the Atlantic States (*Clytus supernotatus* Say), which resembles a Saperda in its form, as much as Cyrtinus does a Dorcadion.

The characters are nearly the same as in the preceding tribe, except that the front coxæ are angulated externally, and the middle ones open; the middle tibiæ are absolutely without sinus or tuft of hair on the outer margin; the tarsi are wider, and the last joint rather longer, and the claws very widely divergent, though not divaricate.

The front is large and vertical, the support of the labrum coriaceous, the eyes coarsely granulated, divided, the antennæ shorter than the body; scape stouter, and less elongated, without cicatrix, the 3d and 4th joints equal, longer than the others. The prothorax is cylindrical, convex, constricted at base; elytra cylindrical, each with an oval elevation near the scutellum, which is much weaker in small specimens, humeri square. The body is densely punctured, brown or blackish, with the scutellum, a narrow oblique band composed of two spots about the middle, and a wider transverse one behind the middle not extending to the suture, of white pubescence.

The relations of this and the preceding tribe with the Anaglyptus group of Clytini are quite obvious.

Tribe VI.—MONOHAMMINI.

I have given to this tribe a greater extension that that proposed by Lacordaire, who restricted it to those genera in which the scape of the antennæ has a large cicatrix, limited by a raised line. The relations between Ptychodes and Dorcaschema are so obvious that they cannot be naturally separated. The tribe as thus enlarged may be defined as follows :—

Front large, vertical, quadrate, flat; genæ long; support of labrum large, coriaceous; mandibles flat; palpi slender, filiform, pointed; eyes somewhat finely granulated, emarginate, lower lobe variable in form. Antennæ longer than the body, very long in the ♂, except in Goes and Cacoplia, scape rather stout, with a terminal cicatrix, except in Dorcaschema. Prothorax with or without a lateral spine, elytra narrowed behind, or cylindrical, wings perfect.

Front coxæ angulated, with distinct trochantin, middle coxal cavities widely open externally; metasternum longer than the first ventral segment (as in all the following tribes); the intercoxal process acute; middle tibiæ with a distinct tubercle on the outer margin; tarsi not elongated, last joint large, claws not fully divaricated, but somewhat moveable as in Cerambycidæ genuini. The last ventral segment is truncate in both sexes, but more so in the ♀.

Three groups exist in our fauna.

Legs long, the front pair elongated in ♂, and the antennæ much longer than the body;	
Prothorax with lateral spines.	MONOHAMMI.
Prothorax cylindrical.	PTYCHODES.
Legs equal, not elongated.	GOES.

Group I.—Monohammi.

Several species of Monohammus represent this group in various parts of the country; they affect the wood of pine trees. The group is easily recognized by the deeply channelled vertex, very long ♂ antennæ, scape with an apical cicatrix, long slender legs, the front pair much longer in the ♂ ; the lower lobe of the eyes is a little longer than wide. The prothorax has a strong lateral spine.

The last ventral segment in the ♂ is feebly, in the ♀ more strongly, truncate ; the ventral segments are nearly equal in length.

Group II.—**Ptychodes.**

These have also very elongate antennæ, and slender legs, the front pair elongated in the ♂ ; the vertex is deeply and narrowly channelled ; the lower lobe of the eyes is broader than long. The first and 5th ventral segments are longer than the intermediate ones, the last is feebly truncate in the ♂, but more strongly in the ♀. The prothorax is cylindrical.

Our genera are as follows :—

Scape of antennæ with a large well-defined cicatrix ;	
Eyes nearly divided.	PTYCHODES.
Scape of antennæ without cicatrix ;	
Elytra rounded at tip.	DORCASCHEMA.
Elytra pointed at tip.	HETŒMIS.

Group III.—**Goes.**

I include in this group Lacordaire's tribe Batocerini, so far as it is represented in our fauna. Neither the difference in the apical cicatrix of the scape of the antennæ, nor the protuberance of the mesosternum seem to me to be of tribal value.

The body is more massive and less elongate than in the preceding groups. The vertex is broadly channelled, the lower lobe of the eyes is long in Goes, transverse in Plectrodera; the antennæ are but little longer than the body, and not very different in the sexes ; the legs are rather short, equal in length, and not different in the sexes. The ventral segments are nearly equal, and the 5th is more distinctly truncate in the ♀.

Three genera occur in our fauna, all in the Atlantic region :—

Scape of antennæ with a distinctly limited cicatrix	
Prothorax cylindrical.	CACOPLIA.
Prothorax with a lateral spine.	GOES.
Scape of antennæ with the cicatrix not sharply defined ;	
Prothorax with a strong lateral spine.	PLECTRODERA

Tribe VII.—**MESOSINI.**

This tribe has but a single representative, *Synaphœta Guexi*, in California; a rather large, stout insect clothed with gray pubescence; antennæ annulated, prothorax with two black vittæ, and elytra each with two angulated black bands.

The front is large and quadrate, labral support large, coriaceous; vertex deeply channelled; mouth large, palpi slender, pointed; eyes finely granulated, almost divided, lower lobe nearly quadrate; antennæ longer than the body in ♂, shorter in ♀, scape long with an oblique apical cicatrix; prothorax with a very obtuse lateral tubercle just behind the middle; elytra wider than thorax, nearly parallel, depressed on the back, suddenly inflexed at the sides, broadly rounded behind.

Front coxæ angulated, closed behind, with large trochantin; middle coxal cavities open externally; mesosternum protuberant; metasternum a little longer than the 1st ventral; 2–4 segments nearly equal, 5th in ♂ somewhat emarginate, longer, channelled, and more deeply emarginate in ♀. Legs rather short, equal, middle tibiæ without tubercle or sinus on the outer margin; tarsi short, and broadly dilated, claws divergent.

The species of this tribe resemble in appearance the stouter forms of the next two tribes, but differ by the strongly angulated front coxal cavities.

Tribe VIII.—**ACANTHODERINI.**

With this tribe commences a long series of genera having the claws divaricate; the front is large, quadrate, vertical, mouth large; support of labrum large, coriaceous; palpi slender; antennæ variable, sometimes excessively long in both sexes, sometimes (sub-tribe Acanthoderini) hardly longer than the body; vertex not much excavated, eyes finely or somewhat coarsely granulated, lower lobe nearly quadrate. Prothorax armed or not on the sides, position of spine variable. Elytra rounded or truncate at tip, usually flattened on the disk, rarely (Dectes) cylindrical.

Front coxal cavities rounded, closed behind, usually by a broad corneous space, sometimes (Dectes) very narrowly, so as almost to appear open. Middle coxal cavities closed externally; legs moderate, thighs usually strongly clavate, middle tibiæ with a tubercle on the outer margin, hind tarsi sometimes short, sometimes elongated.

Sub-tribes are indicated as follows :—

Scape of antennæ clavate.	ACANTHODERINI.
Scape of antennæ cylindrical, slender.	ACANTHOCININI.

Sub-Tribe 1.—**Acanthoderini.**

The scape of the antennæ is gradually thickened towards the tip, and shorter than the 3d joint, without apical cicatrix. The prothorax is armed with dorsal tubercles, and the lateral spine is large, acute, and situated about the middle ; 1st joint of hind tarsi not much longer than the 2d ; ventral segments 2–4 shorter in the ♀, 5th broadly emarginate in ♂, rounded in ♀.

I refer all our species to Acanthoderes, having the front tarsi of ♂ broader, and fringed with very long hairs. Ætheopoctines *Thomson*, founded upon *A. Morrisii* Uhler, does not seem to be sufficiently distinct ; the lower lobe of the eyes is smaller, oblique and oval, rather than quadrate.

In *A. quadrigibbus* the eyes are less coarsely granulated than in the others ; it and *A. decipiens* Hald. are referred by Lacordaire to Psapharochrus *Thomson*, but the genera seem to be founded on very feeble characters, and moreover not to be constant even in those differences.

Sub-Tribe 2.—**Acanthocinini.**

The scape of the antennæ is elongate and slender, scarcely thickened at tip, without apical cicatrix. The prothorax is either tuberculate on the disk, or not ; the lateral spine is sometimes placed at the middle, sometimes behind the middle, sometimes even very near the base. The genera indicate four groups as follows :—

Lateral tubercle of prothorax about the middle.	LAGOCHIRI.
Lateral tubercle behind the middle ;	
Prosternum wider behind the coxæ ; body flattened above ;	
♀ without elongated ovipositor.	LIOPI.
♀ with long ovipositor.	ACANTHOCINI.
rosternum very narrow, body cylindrical.	DECTES.

Group I.—**Lagochiri.**

Represented by the Mexican *Lagochirus obsoletus* Thom. which occurs in Lower California ; a large, robust insect, with the disk of the prothorax tuberculate, the lateral tubercles very large; the antennæ are very long, the 6th joint is a little thickened inwards at tip, and from the tubercle thus formed proceeds an acute slender tuft of stiff hairs, resembling a spine. The 1st joint of hind tarsi not elongated, scarcely equal to the 2d and 3d united.

Group II.—Liopi.

This group is represented by many species in our fauna, all of small or medium size, except one species from Arizona.

The lateral tubercle varies in position from near the middle to the base; in the former position it is very obtuse, but as it moves backwards it becomes more and more acute, and spiniform; the prothorax is feebly tuberculate in some species with obtuse lateral tubercle, and in the same species, the 1st joint of the hind tarsi is not elongated.

The genera may be thus arranged:—

Lateral tubercle submedial; outer joints of antennæ shorter;
  1st joint of hind tarsi not elongated; mesosternum truncate;
    Body and limbs with long erect hairs; lateral tubercle acute. LOPHOPŒUM.
    Pubescent only, lateral tubercle obtuse. LEPTOSTYLUS.
Lateral tubercle of prothorax acute, post-medial; joints of antennæ from 3d nearly equal;
  1st joint of hind tarsi as long as 2d and 3d united;
    Lateral spine distant from base, body stouter; mesosternum truncate. STERNIDIUS.
  1st joint of hind tarsi very long; mesosternum acute behind;
    Lateral spine distant from base, antennæ not ciliate beneath. LIOPUS.
    Lateral spine basal or nearly so, antennæ with a few ciliæ beneath;
      Body slender. LEPTURGES.
      Body stout, depressed. HYPERPLATYS.

The new genus Sternidius is founded upon *Amniscus variegatus* Hald. and allies, contained in division C of my revision, Journ. Acad. Nat. Sci. Phil., 2d ser. ii. 172; it differs from Leptostylus only by the characters mentioned in the table.

Group III.—Acanthocini.

The insects of this group are of medium, or above medium, size, and elongate form; the lateral spine of the prothorax is well developed (though shorter in Graphisurus), and is very little behind the middle, except in Entessus, where it is feeble, and near the base. The antennæ, except in Graphisurus, are excessively long in both sexes, densely fringed beneath with soft hair in the ♂, and occasionally with an apical dilatation on the inner side of the 4th (*A. nodosus*), or 5th (*A. spectabilis*) joint. The 1st joint of the hind tarsi is very long, and the last abdominal segment of the ♀ is prolonged into an ovipositor, nearly half as long as the elytra.

Antennæ not much longer than the body;
Pubescence mixed with erect hairs. GRAPHISURUS.
Antennæ very long in both sexes; pubescence not mixed with erect hairs;
Joints of antennæ 3—11 equal in length. ACANTHOCINUS.
3d and 4th joints very long, 5—11 shorter than 4th. EUTESSUS.

The last genus is founded on a very singular insect from Lower California, of which only ♂ specimens are before me. I infer from the general appearance, and sexual characters, that the ♀ must have a long ovipositor. The outline of the prothorax is straight nearly to the base, as in Liopus, then armed with a short spine; the elytra are uneven with small elevations, as in certain Leptostylus. I have named it *Eu. granosus.*

Our species of Acanthocinus lead insensibly to Eutrypanus; the two species of the Western slope, *Ædilis obliquus* and *spectabilis* have the sides of the elytra suddenly compressed and declivous, with a distinct carina running from the humeri obliquely backwards; the same thing is observed in a less degree in *A. nodosus*, but very feebly in *Lamia obsoleta* Olivier, which is incorrectly referred by Lacordaire to Graphisurus.

Group IV.—**Dectes.**

A single genus, with one species in the Atlantic States and one in Texas, constitutes this group. The form is elongate, and cylindrical, the antennæ about one-fourth longer than the body, scape very long, cylindrical, outer joints diminishing slightly in length. The lateral spine of the prothorax is acute, and slender, placed near the base, directed obliquely and horizontally outwards. The elytra are slightly truncate at tip, not wider than the prothorax; the front coxal cavities are separated by the very narrow prosternum, which is not dilated behind; they are closed very narrowly, so that on superficial examination they seem to be widely open, and were erroneously described as such by me;*

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* Journ. Acad. Nat. Sci. Phila., 2d ser. ii. 144.

the legs are short, the thighs not clubbed, the hind tarsi as long as the tibiæ, with the 1st joint equal to the two following united.

Ventral segments nearly equal; 5th slightly emarginate in both sexes, a little narrower and longer in ♀.

The surface is uniformly finely punctured, and densely clothed with gray pubescence, without elevations or irregularities.

Tribe IX.—POGONOCHERINI.

This tribe, as here defined, contains species of small size, and usually with long erect (flying) hairs, in addition to the ordinary pubescence. They are related to Acanthoderini, having, like them, the claws divaricate, the body generally rather stout, and the scape of the antennæ without cicatrix; the front quadrate, with coriaceous support to the labrum. They differ in having the scape of the antennæ rather shorter and stouter than in the group Liopi, to which they bear the strongest resemblance; the antennæ are only a little longer or shorter than the body, the outer joints gradually shorter; the eyes are moderately or very coarsely granulated (Eupogonius); the front coxal cavities are angulated externally, completely closed behind; the middle ones are angulated, but not open externally; the legs are short, thighs strongly clavate in some genera, but not so in Eupogonius and Lypsimena; the middle tibiæ have an external sinus in some genera, and are quite simple in others; the 1st joint of hind tarsi short or only slightly elongated.

The genera of this tribe are dispersed by Lacordaire among his groups, Estolides, Apodasyides, and Pogonocherides; with the exception of Hoplosia?, which resembles a Graphisurus, with the antennæ of Acanthoderes, the genera have a characteristic habitus.

Three groups are indicated:—

Middle tibiæ with an external sinus; thighs clavate;
  Eyes more finely granulated, lower lobe elongate. ESTOLÆ.
  Eyes less finely granulated, lower lobe not elongate. POGONOCHERI.
Middle tibiæ absolutely simple; thighs not clavate;
  Eyes very coarsely granulated. EUPOGONII.

Group I.—Estolæ.

To this group I would refer *Pogonocherus nubilus* Lec., Proc. Acad. Nat. Sci. Phila., 1862, 39. The eyes are rather finely granulated, the lower lobe elongate; the scape of the antennæ stout, clavate, much shorter than the 3d joint. The lateral spines of the prothorax are large and situated at the middle; there are no dorsal tubercles. The pubescence is gray mottled with black, and there are short, scattered, erect hairs on the elytra; the antennæ are thinly fringed beneath with hairs. The thighs are strongly clavate, and the sinus of the middle tibiæ is distinct; the 1st joint of the hind tarsi is scarcely longer than the 2d. The 5th ventral segment is much larger in ♀, and subtruncate in both sexes.

This insect indicates a genus, which is perhaps identical with the European *Hoplosia*. The mesosternum is parallel and truncate behind; the prosternum in front of the coxæ is well developed and not declivous, so that the head is not retractile.

Group II.—**Pogonocheri.**

The eyes are not coarsely granulated, the lower lobe subquadrate or subtriangular, not elongate; the scape of the antennæ is stout, though less clavate than in the preceding group, and they are fringed with long flying hairs; the prothorax is either armed or not, and has faint dorsal tubercles. The body and legs are clothed with long flying hairs, and tufts of hair are seen on the elytra in Pogonocherus, but in Ecyrus the pubescence is short and close, with a few erect, short hairs proceeding from rows of granules on the elytra, which are carinate on the sides in both genera, sometimes truncate, sometimes rounded at tip. The 5th ventral segment is larger in the ♀, and truncate in both sexes. The thighs are clavate, the middle tibiæ have a small but distinct tubercle on the outer margin;* the hind tarsi are short, with the 1st joint equal to the 2d.

Two genera occur in our fauna.

Flying hairs long; prothorax with lateral spines.	POGONOCHERUS.
Prothorax with feebly rounded sides, pubescence short.	ECYRUS.

The second genus resembles in appearance a small Mesosa, but differs essentially in the claws being absolutely divaricate, and fixed in position.

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* Lacordaire states that the middle tibiæ are simple.

Group III.—**Eupogonii.**

The eyes are very coarsely granulated, with the lower lobe not transverse, they are larger in Lypsimena than in Eupogonius; antennæ not longer than the body, scape feebly clavate, shorter than 3d joint; clothed with long flying hairs in Eupogonius, sparsely ciliate beneath in Lypsimena; prothorax densely punctured, without dorsal tubercles, armed on the side with a small acute spine; elytra sparsely punctured, with irregular mottlings of yellowish pubescence in some species, with only erect hairs in *Eu. subarmatus.* Body and legs clothed with erect hairs, which are usually very long, but shorter in the species just mentioned. Legs short, equal, middle tibiæ without sinus or tubercle; 1st joint of hind tarsi a little longer than the 2d. Last ventral rounded at tip, larger in ♀ than ♂.

Eu. subarmatus bears a deceptive resemblance to Amphionycha, and the first specimen which I obtained being mutilated, was described as belonging to that genus, from which it is abundantly distinct by the coarsely granulated eyes, and entire ungues.

Body with flying hairs;
  Antennæ pilose, joints 5—10 shorter, equal. EUPOGONIUS.
No flying hairs;
  Antennæ sparsely ciliate beneath, outer joints very gradually shorter, prothorax unarmed. LYPSIMENA.

My specimen of the second genus is imperfect, so that the form of the middle coxal cavities cannot be observed; Lacordaire states that they are open. The very coarsely granulated eyes induce me to believe that its strongest affinity is with Eupogonius.

Tribe X.—**DESMIPHORINI.**

The occurrence of *Desmiphora mexicana* Thomson in Texas requires the introduction of this tribe into our fauna. The front is large, the support of the labrum is *not visible*, and the labrum itself is of peculiar form, the basal half is densely pubescent, and the apical half obliquely truncate, presenting an obliquely declivous oval surface, which is finely carinated; the mandibles are large and the head is bent down to touch the prosternum. The eyes are coarsely granulated. The prosternum is short, prominent between the coxæ, and very declivous before and behind. The prothorax is armed with a strong lateral spine. The elytra are parallel and cylindrical, rounded at tip. The front coxæ are angulated externally and closed behind. The mesosternum is, protuberant and perpendicular in front; the middle coxæ are angulated, but scarcely open externally. The 5th ventral segment (in ♀) is as long as the three preceding united, and truncate at tip. The legs are short, equal, the thighs not clavate, the middle tibiæ sulcate externally, with a slight protuberance; 1st joint of hind tarsi not longer than the 2d; claws divaricate.

The antennæ (♀) are two-thirds the length of the body, and pilose, the scape rather stout, scarcely clavate, joints 4–11 gradually, but rapidly decreasing in length.

This insect is remarkable for being covered with very dense brown pubescence, with lines and crests of very long, fine whitish hairs looking like mould. Beneath it is very prettily variegated with darker spots each surrounded with a white line. Length 15 mm. The only specimen I have seen was sent from Texas to Mr. A. S. Fuller, and given me by Dr. Horn.

Tribe XI.—**ONCIDERINI.**

With this tribe commences a series in which the front coxal cavities are angulated externally and closed behind, the middle ones open externally, and the claws moderately divergent. The antennæ in the present tribe are longer than the body in the ♂, about as long as the body in the ♀, and the scape is stouter, subcylindrical, nearly as long as the 3d joint, and has no apical cicatrix. The front is very large, quadrate, vertical, and flat, the support of the labrum coriaceous, the mouth large, the palpi slender, last joint cylindrical, obtusely pointed. The prosternum is very short in front of the coxæ, prominent between them, declivous before and behind; mesosternum truncate between the coxæ. Ventral segments equal in length, 5th broadly emarginate in both sexes, and impressed in the ♀. Legs rather stout, equal; thighs moderately clavate, middle tibiæ with a tubercle on the outer margin, hind tarsi with the 1st joint broad, not longer than the 2d, last joint as long as the others united, claws approximate, slightly divergent.

Oncideres cingulatus is remarkable for placing the eggs in small branches of trees, especially hickory, and then cutting through the bark below, so as to kill the branch, which is afterwards broken off by the wind;* it will be remembered that *Elaphidion villosum* has the same curious habit.

Eyes not very finely granulated, lower lobe elongate;
  Antennæ slender in both sexes, vertex flat. ONCIDERES.
Eyes very finely granulated, lower lobe not elongate;
  Antennæ with joints 1—4 thickened and hairy in ♂; vertex deeply concave. TARICANUS.

The first genus is represented by one species in the Atlantic States, and two in Texas and Arizona; the second by *T. Truquii* Thoms., a Mexican species which occurs in Texas.

Tribe XII.—**ATAXIINI.**

Is represented in our fauna by *Ataxia crypta* (Say), (A. sordida *Hald.*),† a slender insect densely clothed with mottled brown and white pubescence, and remarkable for having the punctures of the elytra arranged in rows, from which proceed black suberect hairs.

The antennæ are as long as the body, slender, annulated, scape stouter, as long as the 3d joint; joints from the 3d diminishing very slightly in length. Front convex, rather broader than long, support of labrum coriaceous, mouth moderate in size, genæ very short; palpi slender, last joint acute. Prothorax as long as wide, with a small, acute, lateral spine; elytra a little wider than the prothorax, cylindrical, rounded or subtruncate at tip. Front coxæ angulated, closed, prosternum not abbreviated in front; mesosternum truncate between the coxæ, cavities angulated, but scarcely open externally. Ventral segments, 1st and 5th a little longer, 5th truncate at tip. Legs moderate, thighs feebly clavate, middle tibiæ without tubercle, hind tarsi with 1st joint nearly as long as the two following, last joint as long as the first, ungues approximate, divergent.

Specimens from the Southern States and Texas have the elytra obliquely subtruncate, and the hairs longer; in those from New Mexico the elytra are almost rounded at tip, and the hairs are shorter. I do not think these differences are of specific value.

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* Haldeman, Trans. Am. Phil. Soc. x, 52.

† Erichson considered this insect as *Saperda annulata* and *lineata* Fabr., described from South America. Vide Lacordaire, ix, 599.

Tribe XIII.—HIPPOPSINI.

The body is extremely slender, the antennæ very long in the first group, short in the others; the front is very long and inflexed, so that the mouth is near to the prosternum; it is small, and the mandibles are nearly perpendicular to the inflexed front; the support of the labrum coriaceous, the palpi not slender and the last joint almost conical and pointed. The eyes are coarsely granulated, emarginate or divided, in the latter case, the upper lobe is sometimes (Spalacopsis) wanting. Prothorax long, cylindrical; elytra elongate. Front coxæ angulated in Hippopsis, rounded in the others, closed behind, middle ones open externally, mesosternum truncate between the coxæ. Ventral segments nearly equal, the 1st sometimes longer, 5th broadly truncate. Legs rather short, equal, middle tibiæ with an external tubercle, tarsi as long as the tibiæ, 1st joint of hind pair short, or slightly elongated (Hippopsis), last joint rather long, claws divergent.

Our three genera indicate different groups.

Front coxæ angulated;
  Antennæ very long. HIPPOPSIS.
Front coxæ rounded; antennæ short;
  Antennæ very pilose, scape not longer than 3d joint; head not elongated, eyes emarginate, upper lobe narrow. DORCASTA.
  Antennæ sparsely pilose, scape very long; head as long as prothorax, eyes divided, upper lobe wanting. SPALACOPSIS.

Dorcasta *Pascoe* is equivalent to Ægilopsis *Horn*, and one species, *D. cinerea* Horn, occurs in Texas.

Spalacopsis occurs in Florida and Texas; *Eutheia* ‖ Guer., *Euthuorus* Duval, was established upon a Cuban species, differing from ours by the antennæ much more hairy, and the scape somewhat longer. These differences do not seem to be generic.

Tribe XIV.—SAPERDINI.

Insects of cylindrical form, of large or medium size, with large, flat, quadrate, vertical front, coriaceous labral support, and finely granulated, deeply emarginate eyes. The palpi are less slender than in the Acanthoderoid series, the last joint more or less oval, truncate at tip. The antennæ are as long as the body, or a little shorter; the scape is nearly cylindrical, a little shorter than the 3d joint, without apical cicatrix; the outer joints scarcely diminish in length. The prothorax is cylindrical, entirely unarmed, and without tubercles; the elytra are wider than the prothorax, cylindrical, usually rounded at tip, rarely (*calcarata*) the suture is armed with a spine, or (*obliqua*) the tip is attenuated and acuminate.

The front coxæ are angulated externally with distinct trochantin, and closed behind; the middle coxal cavities are angulated, open externally, with distinct trochantin. The prosternum is very narrow between the coxæ, and the mesosternum acute behind. The side pieces of the metasternum are very broad in front, and narrowed behind; a character not seen in the preceding tribes. The ventral segments are nearly equal, the 5th somewhat longer, somewhat truncate (♀) or emarginate (♂). Legs moderate, nearly equal, thighs not clavate, middle tibiæ without tubercle or sinus; hind tarsi with 1st joint not much elongated; last joint rather short in general, claws divaricate; the inner one of the front and middle pair in the ♂ of most of our species armed with a rounded lobe or tooth, which is wanting in *S. moesta*, and *concolor*, and in the European species.

The genus Saperda alone is represented in our fauna. Thus far, none have been found on the Pacific slope, except *S. moesta*, a northern species, which extends from Canada to Oregon.

Some of the species are very destructive to cultivated trees, boring into the wood, or destroying the subcortical tissues of the roots.

Tribe XV.—PHYTŒCIINI.

This tribe contains all those species in which the claws are similar, appendiculate or cleft in both sexes; except in Phæa and Oberea the claws are divergent; in the last named genus they are divaricate in the front tarsi, and either divergent or divaricate (*O. Schaumii*) on the hind pair; in Phæa they are divaricate on all the tarsi.

The front is moderately convex, broader than long, the eyes are finely granulated, emarginate or divided; palpi slender, last joint elongate oval, nearly pointed; antennæ shorter, or at most not longer than the body, scape cylindrical, more slender and shorter than 3d joint (Oberea), stouter and nearly equal to 3d joint in the others. Prothorax cylindrical, or obtusely tuberculate on the sides; elytra cylindrical, rounded or truncate at tip.

Front coxæ conical, protuberant, cavities angulated, closed behind, separated by very narrow prosternum; middle coxæ open externally, episterna and epimera separate (Mecas, Oberea, Tetraopes), or nearly connate (Tetrops, Amphionycha). Ventral segments nearly equal in our genera, 5th more or less different in the sexes, and usually somewhat longer in ♀. Legs short, thighs not clavate, middle tibiæ simple, hind tarsi with 1st joint not elongated, last joint rather long; claws variable in position as above stated, always appendiculate or cleft.

The side pieces of the metathorax are narrower behind; they are rather wide (as in Saperdini) in the first group, but less developed in the others.

The genera seem to indicate several groups, but without study of the foreign forms it is unnecessary to define them at present, and I have included them in a single table.

Episterna of metathorax wide;	
Epipleuræ indistinct; ungues feebly toothed or cleft.	MECAS.
Epipleuræ distinct; ungues broadly appendiculate.	OBEREA.
Episterna of metathorax moderate;	
Eyes broadly divided; prothorax dilated on the sides;	
Ungues broadly appendiculate.	TETROPS.
Ungues cleft.	TETRAOPES.
Eyes not divided; ungues cleft.	
Antennæ pilose, outer joints suddenly shorter.	AMPHIONYCHA.

The American species of Tetrops are referable to Phæa *Newman*, which seems not sufficiently distinct from the European genus to be retained in a natural classification.

The species of Tetraopes are numerous and very similar, being of a bright red color with small black spots on the prothorax and elytra; they live exclusively upon plants of the genus Asclepias.

Tribe XVI.—METHIINI.

This tribe contains the lowest organized of the Lamiidæ; undifferentiated forms, which exhibit strong relationships to Oeme and its allies among the Cerambycidæ.

The body is elongate, the prothorax cylindrical, the elytra shorter than the abdomen, separately rounded at tip, and the wings are extended along the dorsum of the abdomen, and very imperfectly folded at tip.

The eyes are sparsely pilose, very large, coarsely granulated, deeply emarginate; less coarsely granulated and divided in Dysphaga; the front short and perpendicular, labrum obsolete, or connate; mandibles short, but very stout at base, and trigonal; palpi unequal, short, and cylindrical, the labial nearly pointed, the maxillary truncate, with a terminal oval cicatrix or mammilla representing the last joint in Methia; still more feeble and nearly atrophied in Dysphaga. The prosternum is elongate in front of the coxæ, which are conical and prominent; the cavities are *confluent*, separated behind by a very narrow point of prosternum, widely angulated externally and *open behind*. Middle coxæ conical, prominent, contiguous, cavities confluent, widely open externally; hind coxæ nearly contiguous, also prominent. Ventral segments equal in length, cylindrical in Styloxus, with the 5th broadly emarginate, and 6th visible; of softer consistence, 5th longer with a large hairy vulva-like excavation in three (♂) specimens of Methia before me; flat with the segments imbricate at the sides (as in Lampyridæ) in Dysphaga, 5th joint deeply emarginate in ♀, longer in ♂, with the same vulva-like excavation as in Methia, but broader and patulous, so as to become triangular; the abdomen is black in ♀ but yellow in ♂ of Dysphaga.

The legs are moderate in Styloxus, with the thighs clavate; more slender, with the thighs not clavate in Methia; very feeble in Dysphaga; the tarsi are short, and the last joint is as long, or nearly so, as the others united; the claws are small and divaricate.

The antennæ are longer than the body in both sexes; pilose in Methia, sparsely ciliate in the other two genera. The scape is short in Styloxus and Dysphaga, and is armed at tip with a stout spine in the former; it is longer and more slender in Methia; the 2d joint is distinct in Styloxus, but obsolete in Methia and Dysphaga, so that only ten joints are visible.

Methia pusilla Newman, occurs in the Southern States; *Dysphaga tenuipes* (♂ ventralis) Hald., in Pennsylvania, in hickory twigs, *D. lævis* Lec., in Illinois; they are similar in size and form, but the prothorax is coarsely and densely punctured in *D. tenuipes*, while it is shining and only sparsely punctured in *D. lævis*.

Styloxus is founded on a species from Lower California, somewhat larger than *Methia pusilla*, but also of a uniform brown color. I have named it *S. lucanus*.

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